THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL XIII. Copyright, 1883, JAMES R. OSGOOD & Co., Boston, Mass. No. 379.

MARCH 31, 1883.

Entered at the Post-Office at Boston as second-class matter.

CONTENTS.

SUMMARY: —
The Sanitary Condition of Health Resorts on the Atlantic Coast. — Sewage Irrigation. — Gennevilliers prospering by the Aid of Paris Sewage. — The New Competition for a Monument to Victor Emmanuel. — The Fire Underwriters and the New York Dry-Goods District. — Tree Planting in Ontario. — "Ready-Made" Churches 145
WATER-CLOSETS. — VII. 147
PAPERS ON PERSPECTIVE. — XIX. 148
FROM BAYREUTH TO RATISBON. — IV. 149
THE ILLUSTRATIONS: —
Our Foreign Exchanges. — The United States Court-House, Frankfort, Ky. — Perspective Diagrams: Plate XXI. . . 150
NEW BOOKS. 152
AN OLD CURIOSITY SHOP. — THE TUILERIES. 153
ARTISTIC FIRE-ESCAPES. 154
TIMBER PRESERVING. 154
COMMUNICATIONS: —
Concrete Buildings. — Earth-Closets. 155
NOTES AND CLIPPINGS. 156

A REPORT has been prepared for the National Board of Health, by Mr. E. W. Bowditch, upon the sanitary condition of the health resorts upon the Atlantic Coast. A similar report, made to the Massachusetts Board of Health some years ago, upon certain watering-places in that State, excited great attention, and led directly to a most wholesome reform in sanitary matters in the places spoken of, and it is to be hoped that the same result will follow the appearance of the present document in the territory of which it principally treats. Mr. Bowditch's observations were mostly made, for the purpose of the present paper, in the belt of sandy sea-coast between Cape May, at the southern extremity of New Jersey, and the mouth of the Hudson River, and as this belt is occupied by a continuous line of towns and villages, which accommodate in summer an immense number of persons, he found an ample field for inquiry and criticism. Atlantic City, the most frequented of these resorts, which has a regular summer population of fifty thousand, often swelled for a day to seventy-five thousand by excursions from the great cities near by, Mr. Bowditch found to be built upon a spit of sand, ten miles long and three-quarters of a mile wide, separated from the main land by a navigable creek, with seven miles of salt marsh beyond, and fronting the sea on the other side. No portion of the territory is more than twelve feet above tide-water, and there are of course no brooks or springs on the island. Water for drinking was formerly obtained from shallow driven wells, but these have been abandoned, and cisterns have been generally substituted for them. Within the last season, however, a supply has been brought across the marshes from the main land, so that the town is now much better off than most summer resorts in this respect. In regard to drainage, the complement of water-supply, much remains to be done. No sewers exist, and none are practicable under present circumstances, as their outfall would necessarily be in the creek at the back of the island, where it would be very difficult to get rid of the foul matters delivered. As a substitute for sewers, cesspools are universally used, but the ground-water lies so near the surface that their contents drain away slowly, and are not carried far, so that they soon become offensive. During the past season garbage, which gives more trouble in watering-places, if possible, than the cesspools themselves, has been regularly removed every day, by a public service, from all private houses, and twice each day from the hotels, so that in this respect the police of the place is exceptionally good. It is impossible not to wish that means might be found for extending the operation of the same service to ordinary drainage matters. This does not seem impracticable; and something of the kind has become a necessity if the so-called "health resorts" are to continue to deserve their name.

THE most distinguished of French sanitarians, M. Durand-Claye, sends to *Le Génie Civil* a communication which comprises the substance of an address delivered by him at the Hygienic Congress in Geneva last year, but will, for all that, be new, as well as interesting to most readers. The paper treats of the subject of municipal hygiene in general, and particularly of the sanitary needs of the city of Paris. No one needs to be told that the drainage of Paris, as we understand the word, hardly exists as yet. The "*fosse*," or tight cesspool, emptied at fixed periods by the public scavengers, still keeps its place under every house, and the great sewers convey little else than the washings of the streets. With the introduction of an abundant water-supply, however, has come the necessity for a different system. As M. Durand-Claye says, water, the prime instrument of domestic hygiene, must, so long as the cesspool system is retained, be proscribed by house-owners, who are obliged to pay the scavengers by measure for the removal of waste liquids, and will naturally employ all possible means for restricting their quantity, and if the benefits of cleanliness are to be enjoyed by the people, the water with which they wash themselves and their houses they must be got rid of in some better way than that now in use. After discussing the Liernur pneumatic system, which he condemns for the very reason that it also restricts the amount of water used for household purposes, the writer proceeds to consider the various modes of conveying and disposing of the large flow of sewage which he thinks to be the necessary consequence of the best conditions of life in cities. Like most other modern experts, he rejects totally that form of sewage disposal which consists in pouring the nitrogeneous contents of the drains into the sea, regarding this as a futile expedient, adapted only for a temporary use. The various processes of decantation or mechanical filtration, as well as those of chemical precipitation, he also considers to be practically valueless. Recent analyses have shown that the clarified liquid remaining from these operations always retains at least one-half of the azotized matters contained in the sewage before treatment, and is therefore very nearly as unfit as ever for return to the water-courses into which it is generally allowed to flow.

THERE remains, then, as he says, but one practical and rational mode of purifying sewage. This is the treatment by irrigation, in which the cleansing and oxidizing action of the soil is assisted by vegetation. Already, this system is employed for more than one hundred and thirty towns in England, as well as the great cities of Berlin, Dantzic and Breslau, and to a considerable extent for Paris itself; and continued experience increases the advantages which it is found to offer. Some very interesting experiments with the microscope have been made upon the sewage of Paris, to ascertain the changes which it undergoes after delivery upon the fields of Gennevilliers, and it has been found that by actual count the sewage as delivered contains about twenty thousand microscopic germs to the gramme, or cubic centimetre. After soaking through the soil, as collected from the outlet-drains which conduct the surplus liquid from the fields, the average number of germs is found to be twelve to the gramme. The water of the Seine at Clichy contains thirty-two hundred germs to the gramme, and at Bercy fourteen hundred, while the water of the Vanne, which has lately been introduced into Paris for drinking and cooking, and is delivered to the houses in special pipes, contains sixty-two; or, in other words, is five times more impure than the street-washings of Paris, after a single rough filtration through a saturated soil. It is remarkable that the oxidation of the nitrogeneous part of sewage, which is known to take place in the pores of the soil, is now found to be due to the action of organized animalculæ, millions of which exist in the surface loam. This is demonstrated by a curious experiment, which has been several times repeated. A tube of glass, six feet long, is filled with natural sand, and sewage of the foulest character is poured in at one end. After some time the liquid appears at the lower end, perfectly oxidized, with all its ammoniacal compounds converted into inert nitrates, the analysis of which gives an amount of nitrogen just equivalent to that contained in the organic part of the original sewage. If now a little chloroform is allowed to pass into the tube, the industrious little organisms contained in the sand are put to sleep, and the sewage passes through unchanged; and only a thorough washing with pure water can re-establish the oxidizing action of the earth.

SO well does the system of irrigation work at Gennevilliers, notwithstanding the complaints made a few years ago in regard to the offensive flooding of the ground, that the demand among farmers for a share of the fertilizing liquid grows greater every year. In ten years the number of acres submitted to irri-

gation has multiplied by ten, while the quantity of sewage used upon them has increased in even greater proportion. The rental of land in the irrigated district has risen from forty francs an acre to two hundred, and farmers from all directions, attracted by the wonderful productiveness of the soil so treated, have settled in the place in such numbers as to increase the population, according to the census, thirty-four per cent in five years. At the time of the complaints which were so loudly made, apparently from some interested motive, the city authorities of Paris took measures, out of pity for the injured people of Gennevilliers, to find other irrigation grounds farther away, but the people of the town, alarmed at the prospect of losing their monopoly of the fertilizing streams, suddenly withdrew their objections, and joined cordially last year with the Parisians in a treaty by which the delivery of the sewage to them is to be continued for twelve years. So satisfactory is this arrangement to the villagers that they have already celebrated the treaty by erecting a monumental fountain in the most conspicuous part of the town, bearing two clasped hands, with the motto, Paris —Gennevilliers, 1881. After this experience, which is only that of all the other towns which have tried sewage disposal by surface irrigation, it is certainly remarkable that not a single community in the United States should have had the courage to adopt the same system. That want of money is not the reason for this backwardness in adopting the results of so many successful experiments is shown by the readiness with which the people of Boston, for instance, have undertaken to spend an enormous sum in conveying the sewage of the city into their harbor; and by the popularity of the preposterous scheme for building in the suburbs of the same city a main trunk sewer nearly as long as that of London, to convey to tide-water the sewage of a dozen villages which have no sewers at all, and are not likely to have any until such a mode of disposition has long been obsolete.

OFFICIAL notice has been sent to the Department of State that the Italian Government desires to invite artists of all nations to compete in furnishing designs for a national monument, to be erected at Rome in honor of King Victor Emmanuel. The monument is to consist of a bronze equestrian statue of the King, standing upon a base which is to be at least thirty metres wide and twenty-nine metres high in its central portion. Elsewhere its height is to be at least twenty-four metres. The design of the base is left entirely to the taste of the artist, and the steps leading to the esplanade on which the monument is to be placed will be regarded as a part of the structure. Drawings will be received from November 15 to December 15, 1883, and will be judged by a royal commission. The author of the design placed first will be awarded a premium of fifty thousand francs; and fifty thousand more will be divided by the jury among the most meritorious of the other competitors. In arranging this new competition the Italian Government has shown its liberality, as well as its sincere desire to obtain the best possible design for its memorial to the patriot king, in a way which should insure the success of its endeavor. It is said, and probably with reason, that none of the projects submitted in the first trial which had any great artistic merit could have been carried into execution even for the large sum which it was proposed to expend; and this, if true, would be a sufficient reason for throwing them all aside; but it was also said, perhaps with truth, that none of them were in other ways suited to the circumstances.

AT the last meeting of the New York Board of Fire Underwriters, held in November, a committee was appointed to visit the so-called "dry-goods district," and report upon it, suggesting better means for protecting the property in the district from fire. The report is now completed, and contains at least some interesting statistics. The height of structures is an important matter to firemen, and the committee noted the dimensions of those which it inspected, finding that more than half the buildings in the district are over seventy feet high; and of these one hundred and thirty-six are over eighty feet, twenty-four over ninety feet, and seven over one hundred feet high, while one reaches the height of one hundred and twenty-nine feet. There can be no question that these lofty piles, extending far above the natural level of the water in the Croton pipes, and nearly as far above the effective reach of the stream from an engine, menace the safety of the whole neighborhood about them, and the committee very properly proposes that the rates of premium should be advanced upon all buildings more than sixty-five feet in height, unless they are made of fire-proof materials throughout. Another recommendation of the committee seems to us hardly so reasonable, although it is perhaps justified from the underwriters' point of view. It has been the rule in New York for some years to make a small reduction in premium rates upon goods stored in buildings furnished with stand-pipes, on the theory that by means of these pipes, which have branches for couplings at every floor, with a connection for an engine hose at the foot, water could be applied with much greater precision and effect to burning material in any room than if it had to be thrown at random from an engine in the street. The chief engineer, however, having mentioned that most of the stand-pipes in the district are useless from neglect, the committee forthwith asserts that "No farther allowances should be made for the stand-pipes commonly in use." If this is intended to mean that the underwriters will henceforth test the stand-pipes on account of which a rebate of premium is asked, and will grant such rebate only where the pipe is in good condition, the effect of the new rule would be very salutary; but if, as is too often the way with insurance managers, a statement which we cannot help regarding as rather ill-founded should be seized upon as a pretext for refusing under any circumstances the small concession now made, the consequences to the underwriters may be serious.

THE Government of the Province of Ontario, comprehending that, although one hundred and twenty million acres of primeval forest still exist within its territory, the replacing of its timber supply for future needs will depend upon the wise provisions made now, has had under consideration a bill providing for the payment of a bounty out of the public treasury for the planting of trees along farm boundary lines, and by the sides of roads. The bounty proposed is not very large, the maximum sum being twenty-five cents for each tree, but it is quite enough to make it worth while for farmers to preserve and transplant the young saplings which they find in the way of their agricultural operations, and a moderate annual expenditure would in the course of years produce results of immense importance. A little calculation will show that if the highest bounty were paid in all cases, a subsidy of fifty thousand dollars per annum would at the end of three years represent six hundred thousand young trees; or, supposing one out of every six to die, half a million of growing saplings, which, if planted only along the roads, thirty feet apart, would line them on both sides for a distance of fourteen hundred and twenty miles. Continued for fifty years, the same subsidy would have led to the planting of ten million trees, worth on an average five dollars apiece, all belonging to the persons who were paid for setting them out; but bringing in nevertheless to the public treasury in the form of taxes, supposing these to be reckoned at the moderate rate of one per cent, five hundred thousand dollars a year, or ten times the amount of the outlay. This is, of course, a rather summary way of calculating profits, but there is certainly reason for believing that in Ontario, and still more in this country, a movement of the kind suggested would be very judicious.

A CORRESPONDENT sends us a slip cut from a newspaper, which contains a hint apparently of great value to a certain variety of architects. The slip, which is cut from a denominational journal, seems to be an editorial article, affably mentioning the enterprise of a Mr. B. who has put forth a "list of new designs for churches." The plans are numbered from one to seven, and represent buildings ranging in cost from fifteen hundred to sixteen thousand dollars. One of the plans is, it seems, on exhibition in the editor's office, and we can readily credit his assurance that "it has a tower and belfry, and will certainly make a very handsome church." The singular feature about the matter is that the exhibition is not a gratuitous one, but one dollar is charged for the privilege of examination. If the plan is adopted, copies are furnished for five dollars, which "is certainly cheap," or would be so if it were not for the advantages which the blue process offers for the multiplication of drawings. Whatever may be the merit of the designs, which are probably quite worth the price asked for them, the idea of charging church-committees and other interested inquirers a dollar a head forlooking at them is certainly novel, and if the ardor of such bodies in the search of means for circumventing the necessity of employing professional architects should turn to the advantage of the ingenious Mr. B. and his editorial friend, we should not be sorry.

WATER-CLOSETS. — VII.

HELLYER'S VALVE-CLOSET.—S. S. Hellyer, of London, received patents, in 1875, for a valve-closet in which the valve opened in a downward direction from the bowl. The bowl is attached to the receiver by set-screws, and the receiver is enamelled. The part of the valve which shows from the bowl is earthenware, under which, and with a larger diameter, is a disc of rubber, leather, or other pliable material, which has a seat against a metal rim, in this manner forming a water-tight joint. The rubber disc rests on a third disc of brass or some other suitable metallic substance. The valve is held firmly against its seat by the usual weighted lever, but the end of this lever, instead of being bolted so as to work on a fixed axis, is hinged or bolted to a spring. By this means the valve would be less liable to injury from violent jerks at, or careless dropping of, the hand-pull. The overflow enters the receiver behind the valve, and is supposed to keep this part of the valve and receiver clean. The receiver is ventilated, enamelled and small, being only large enough to permit the valve to work properly. The water is admitted to the bowl through a flushing-rim, and is taken from a special cistern, or directly from the water-main. In the illustration the supply-valve is connected to a waste-preventer, and is operated by a small adjustable stud attached to the hand-pull by a set-screw.

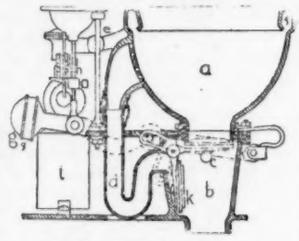


Fig. 69. — Hellyer's Valve-Closet.

a, Bowl. *b*, Receiver. *c*, Vent. *d*, Overflow. *e*, Supply. *g*, Weighted lever. *h*, Hand-pull and stud for opening supply-valve. *i*, Waste-preventer. *k*, Valve.

Fig. 70. — Detail of Valve. — Hellyer's Closet.

a, Earthen, or porcelain top.
b, Rubber, or metal disc.
c, Brass, or other metal back.

Underhay's Valve-Closet. — F. G. Underhay, of London, manufactures the Bramah, with slight changes. He also manufactures another simple valve-closet, in describing which he writes: "The bottom valve shuts against a ring of thick India-rubber bedded into a metal seating, effectually preventing leakage from unsoundness of valve, — the great drawback to the old valve or Bramah closet. A good flush of water is obtained, no matter how carelessly the handle is pulled up or suddenly let down. . . . As the connection is already made between the supply-valve and fan, but one joint is necessary in fixing these closets."

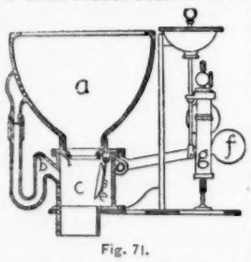


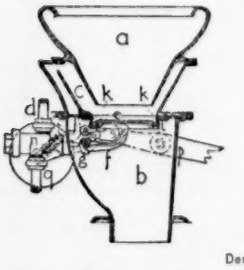
Fig. 71.

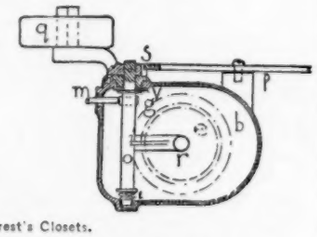
Underhay's Valve-Closet.

a, Bowl. *b*, Overflow. *c*, Receiver. *e*, Valve. *f*, Weighted lever. *g*, Brass regulator-valve. *h*, Ring of India-rubber.

The simple U-shaped overflow enters the receiver, so as to face the valve when it is open. In the more costly closets of this kind are silvered-glass valves, hermetically sealed, so that a bright surface is seen on looking into the basin; also white, gold-lined, and fancy basins, cut-glass and ivory handles, with silver-plated dish and fans. This closet has been extensively used in England. In the illustration, one of Underhay's "air-valve regulators" is shown in position attached to the closet. This regulator will be described under the head of waste-preventers.

Demarest's Whirlpool, Climax, and Acme. — Mr. John Demarest, of the firm of J. L. Mott & Co., New York, has been a prolific inventor of water-closet apparatus, and his closets have been extensively used in this country. He received letters patent from the United States for a valve-closet, and also from Great Britain for the same closet in 1876. J. L. Mott & Co. manufacture this closet under three names: "Whirlpool," "Climax," and Acme." The valve and its mode of working and the receiver are the same in each case. In the "Whirlpool" closet the bowl is placed in a metal hopper that is joined to and forms a part of the receiver or container, while in both the other closets the bowl is placed directly on the receiver, and held in place by metal buttons or strips bolted to the receiver, and projecting over a flange at the bottom of the bowl. In the "Acme" closet the bowl is attached to the receiver in the usual manner by set-screws. I quote the following from Demarest's specifications: —





Demarest's Closets.

Fig. 72. — "Whirlpool" Closet.

Fig. 73. — Section of Receiver.

"The basin-valve is operated by an arm upon a weighted rock-shaft; the opening through which the shaft (or spindle) passes is rendered tight by a washer. The weighted arm of the rock-shaft is operated upon by teeth upon a lever which receives motion from an ordinary water-closet pull. The valve which admits water to the bowl is operated by a cam on the rock-shaft, and is provided with a cup leather piston and a spring to regulate the gradual closing of the spring. . . . The valve (at the bottom of bowl) is made of an elastic ring below the porcelain or enamelled surface. The weight on crank arm is preferably provided with a spring between the weight and its arm, to prevent concussion."

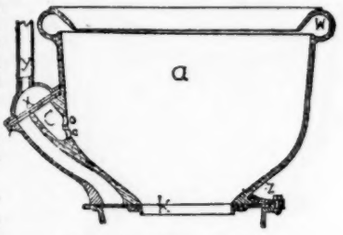


Fig. 74. — "Climax" Closet.

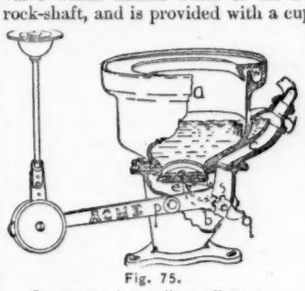


Fig. 75.

Perspective view. — "Acme" Closet.

Demarest's Valve-Closets.
(Figs. 72, 73, 74 and 75.)

a, Bowl. *b*, Receiver. *c*, Overflow. *d*, Supply-pipe. *e*, Valve. *f*, Finger, or lever to support valve. *g*, Cam to open supply-valve. *i*, Rubber-ring. *k*, Metal-seat. *l*, Swivel. *n*, Supply-valve. *m*, Rod to operate supply-valve. *o*, Rock-shaft, or spindle. *p*, Weighted lever. *q*, Counterpoise. *s*, Toothed gearing. *r*, Spherical end of finger. *t*, Springs. *v*, Washer. *w*, Flushing-rim. *x*, Flap-valve. *y*, Vent to overflow.

In practice the weight is not attached directly to the spindle, as described in the specifications, but is placed at the end of the lever, which is connected with the hand-pull. (Figure 75.)

The overflow in the "Whirlpool" closet is between the bowl and the hopper in which the bowl is set; while the "Climax" and "Acme" have the greater part of the overflow moulded on the bowl. A bent pipe enters the overflow at its crown, and is intended to carry off any gases generated in the receiver and prevent the trap of the overflow from being siphoned. The overflow of the "Climax closet" has a flap-valve as an additional protection against gases entering the room through the overflow. This flap-valve was probably added because of Dr. Fergus's experiments on the permeability of water-traps; while Dr. Carmichael's experiments on the same subject at a later date have caused the manufacturers to leave it out of the "Acme" closet. The "Climax" and "Acme" closets both have flushing-rims which differ from each other in their form.

Jennings's Valve-Closet. — J. G. Jennings, of London, invented a valve-closet which was patented in this country in 1880, having previously received letters patent from Great Britain in 1878. This closet Jennings claims as an improvement on the Bramah. The bowl, supply, receiver, vent-pipes, and manner of working the valve have nothing new in them; the principal novelty is in the arrangement of the overflow. The valve was invented by Jennings in 1868. The overflow empties directly into a U or half-S trap, in which there is a bell opening for a lavatory or bath waste (this is claimed as a novel feature). There is a ball-valve in the overflow which has its seat on a sharp metal ring. This ball would take and keep its seat by the action of gravity, being raised only by water coming into the receiver, and backward pressure either of water or gas would only tend to make the ball fit more tightly, unless some foreign substance should get between the ball and its seat. To prevent waste matter entering the overflow, the valve at the bottom of the bowl, when open, closes the outlet of the overflow into the receiver. The receiver is properly vented.

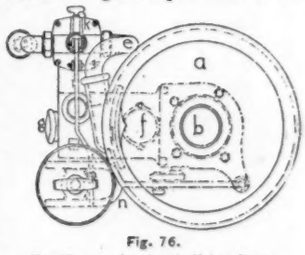


Fig. 76.

Top View. — Jennings's Valve Closet.

a, Bowl. *b*, Valve. *c*, Receiver. *d*, Vent-pipe. *e*, Supply. *f*, Ball-valve. *g*, Opening for lavatory waste. *h*, Overflow. *i*, Lever for supply-valve. *k*, Waste-preventer. *l*, Fan.

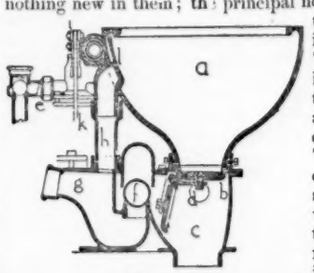


Fig. 77.

Section. — Jennings's Valve-Closet.

PAPERS ON PERSPECTIVE.—XIX.

THE INVERSE PROCESS.

IT is sometimes desirable to invert the procedure described in the preceding chapters. Instead of beginning with an orthographic plan and elevation, deriving thence a perspective plan, and then finally arriving at a complete perspective drawing, it is often possible by a reverse process to derive the perspective plan and elevation from the drawing, and from them to obtain the actual shape of the object, and its relations to the spectator and the plane of the picture. Its dimensions can also be determined if the dimensions of certain lines in it are known.

Photography has given to the discussion of this subject an importance which it did not previously possess, for it is often desirable to obtain from the perspective view taken by the camera the real proportions or dimensions of the objects shown. This is sometimes impossible, sufficient data not being furnished by the picture itself, and no other information being accessible. But when it is possible it is not difficult, as I shall endeavor to make plain.

380. To effect the interpretation of perspective drawings with any approach to precision it is necessary that the perspective lines shall make a sufficiently large angle with each other or with the horizon clearly to indicate the position of the vanishing-points; that is to say, the object shown must either be large, near at hand, or considerably above or below the eye.

381. If the object is in oblique, or three-point perspective, and its three vanishing-points can be fixed with precision, there is no difficulty, as has been shown in treating of that subject, in determining the position of the spectator. This fixes the centre of the picture, the station-point, the distance of the station-point from the centre and from each of the vanishing-points, and all the points-of-distance. For lines connecting the three vanishing-points represent the three horizons, and the meeting-point of the perpendiculars let fall from the angles of the triangle thus formed upon the opposite sides, is the centre C; the distance of the station-point in front of this point, and its distance from each of its vanishing-points, is then easily determined (168), and the points-of-distance found. If, then, the length of any of the vanishing lines is known, a line of measures parallel to one of the horizons can be drawn through one of its extremities, its true dimension according to the scale of the drawing, or of that part of it, found by means of a point-of-distance, and the scale of the drawing and the dimensions of every other part ascertained.

382. This is illustrated in plate XXI., Figure 110. If we suppose the perspective of the rectangular block to be given, the vanishing-points V_L, V^M, and V_O, and the traces that connect them, can be obtained, the ground-lines, or lines of measure *o m*, *l m*, and if necessary *l o*, drawn, and the relative dimensions of the edges determined. Whether the block is large or small cannot of course be learned. The size of the miniature block, supposed to be in contact with the picture at *a*, is determined, its edges being equal to *a l*, *a m*, and *a o*; but there is no means of knowing how much larger the block itself is than this miniature representative. To determine this we must know either the actual dimensions of one edge of the block, or the distance of the block behind the picture. Neither of these can be shown by the picture itself.

383. If the object is drawn in two-point, or angular perspective, as is generally the case, it does not suffice for the determination of its shape, position, and relations to the spectator that the vanishing-points of its principal lines should be known. For fixing two vanishing-points does not, as fixing three does, determine the position of the spectator and of the centre of the picture, and thence of the points-of-distance, nor does it determine the *attitude* of the object, or the angles its sides make with the plane of the picture. Fixing the vanishing-points only restricts the *locus* of the spectator's position to the semi-circle subtended by the line joining them; they determine neither the attitude of the object nor its shape. In Figure 111, for instance, we have at A and B the same perspective and the same vanishing-points. But at A the station-point, S, and the centre, C, are assumed to be well over towards the right, and at B, towards the left. The perspective plans and the elevations derived from them are shown below. The plans are alike, but the points-of-distance being different the dimensions found upon the ground-lines are different, and the proportions of the building and the slope of the roof come out differently. But while the buildings, though differing in size and shape, are alike in perspective, the doors and windows, which are of the same size and shape in one building as in the other, come out differently in perspective.

384. In order to interpret correctly a drawing made in angular, or two-point perspective, it is necessary to have definite information as to the position either of the centre, C, of the vanishing-point at 45°, V_X, or of one of the points-of-distance, D^R or D^L. The centre is generally nearly in the middle of the picture, but that it is exactly there is not to be taken for granted. Its position is often precisely indicated, however, by some secondary object, which is drawn in parallel perspective; and it is always a good rule to introduce some such object as the pile of boards in Figure 111, A, as a guide to the spectator.

385. It often happens, however, especially in architectural drawings, that the nature of the subject is such as to furnish diagonal lines lying at 45° with the principal directions, lines that we have called X, dividing the angle made by the lines R and L. Figure 112 shows, by means of a little elementary geometry, how in this case the station-point, S, is to be found, V^R, V^L, and V^X being given. As the angle, V^R S V^X, is an inscribed angle of 45°, its sides must include an arc of 90°. A line drawn from *x* in the figure through V^X to the opposite circumference fixes the position of S, and hence of C, D^R, and D^L.

386. It is not often that the position of either of the points-of-distance can be detected by mere inspection of the picture; but it often happens that the real or proportional dimensions of some of the lines in the picture are known. In that case one of the points-of-distance can be ascertained, and the other elements of the problem then easily determined.

Let us suppose, for instance, in Figure 113, that the rise and tread of the steps are known to be six and twelve inches. A line of equal measures, *l r*, laid off parallel to the horizon, from the front edge of the first step in length equal to twice the vertical edge, forms, with the horizontal line in perspective and a third line joining their further ends, the three sides of an isosceles triangle. The vanishing-point of the third line, the base of the triangle, gives the point-of-distance D^R. The distance from this point to its corresponding vanishing-point is the distance of the station-point from that vanishing-point; that is to say, $D^R V^R = V^R S$.— S, which must lie somewhere in the semicircle of which $V^L V^R$ is the diameter, — is then easily found, as in the figure. C, D^L, and V^D, immediately follow.

387. When the drawing to be interpreted is made in parallel perspective it is generally easy enough to find the centre of the picture, the vanishing-point of the lines perpendicular to it. But, as in the previous case, it is impossible to tell what is the real shape of the objects represented, or to know from what distance the picture should be looked at, unless the real shape of some one of the objects is known independently. If Figure 20, for instance, Plate VI, is looked at from a point about three inches in front of C, as may be done by looking at it through a pin-hole, so as to obtain a clear image on the retina, the little pavilion represented looks about square, the steps on the side seeming very steep. Seen from a distance of several feet it looks two or three times as long as it is wide, and the steps seem of very easy grade. The posts at the corners are presumably square, and the lines of the pavement and of the hips of the roof, in plan, are presumably directed to the vanishing-point of 45°, which is the point-of-distance; and the steps have presumably the same slope as those on the right. The point-of-distance can be found by the same method as in the preceding paragraph, and the true shape of all the objects in the picture determined.

388. Of course these results are based upon the understanding that the objects represented are rectangular. If the lines that define them are known to form acute or obtuse angles, instead of angles of 90°, the line joining their vanishing-points must be treated as the chord of a circle instead of as a diameter, as is done in Figure 114.

At A is shown an obelisk in perspective, presumably square in plan. The methods described in the previous paragraphs suffice to determine successively the principal vanishing-points, V^R, V^L, and V^X, the centre, C, the points-of-distance, D^R and D^L, and a perspective plan. The dimensions can then be determined, according to the scale of the drawing, and that scale may be determined if any one of the dimensions is known.

At Figure 114, B, is another drawing, the horizontal and vertical lines of which are identical with the first. But this obelisk is understood to be triangular and equilateral, with angles of 60° instead of 90°. A perspective plan, with the vanishing-points V^R and V^L, are easily determined, as is also V^X, the vanishing-point of the line bisecting the solid angle in contact with the picture. These elements suffice to determine the orthographic plan, Figure 114, C. As the angle at the station-point, S, is only 60°, in place of 90°, it is included in an arc of 240°, the point S lying somewhere in that arc, which is its *locus*. The point V^X, however, enables us, as the point $V^{X'}$ did in the previous case, to fix the exact position of S, by drawing a line through the summit of the arc at X, and the point V^X. If then the eye is placed in front of Figure 114, A, opposite C′, at the distance indicated by S′, on the plan below, the obelisk will look square; if it is placed opposite C, in Figure 114, B, at the distance indicated by S, it will appear to have the section of an equilateral triangle.

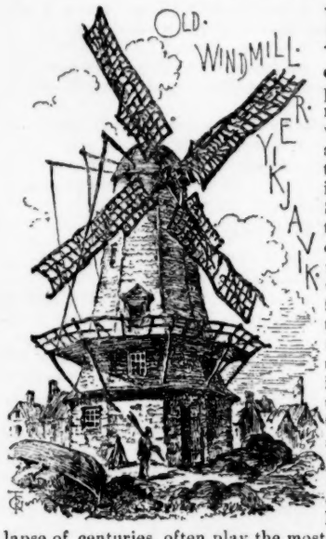
389. The little pyramid on top is, however, differently drawn in the two cases, and the position of the apex suffices to show that the upper figure has four sides, the lower but three. The angles at which these sides meet, however, is necessarily intermediate.

390. The fact that acute or obtuse angles can thus be interpreted as right angles makes it difficult to represent them satisfactorily when there is nothing else in the picture to guide the judgment. It often happens in the case of buildings situated where two streets meet at an odd angle that drawings of them look as if the buildings were square. To obviate this it is necessary, as has been said, to introduce something which is unmistakably rectangular, such as an awning or chimney or a cart backing up to the sidewalk, like the pile of boards in Fig. 111, A.

391. If it were not, indeed, for the facility with which the mind

thus gives the most reasonable interpretation to the phenomena that meet the eye, even the right angles shown in perspective would generally look either acute or obtuse, since it is only when the eye is exactly at the station-point, or rather when it is on the circumference of a semicircle lying between the vanishing-points, that the angle really looks as a right angle would. But these distortions, like the other distortions that arise from abandoning the station-point, are made light of by the intelligence. It is only in the case of circles, cylinders and spheres that one is disturbed by them. In those cases, indeed, remaining at the station-point hardly suffices to reconcile one to the drawing, as has been explained.

FROM BAYREUTH TO RATISBON. — NOTES OF A HASTY TRIP. — IV.



I WILL not say that the interior of the Bamberg Cathedral is as delightful as its exterior. Of course there are plenty of tourists who never really *see* a church at all; but with those who do have artistic sympathies there are, I find, two very distinct ways of looking at mediæval buildings. Some few eyes care most for the actual architecture itself, others — and these by far the majority amongst travelling non-professionals — care only for the architecture as a means toward an effect. It is the *effect* of an interior — its picturesque as distinguished from its strictly architectural features — which appeal to them. Color, light, the action of time, and the thousand and one objects of art and history which, when a church has been undesecrated and unrestored, have accumulated through the lapse of centuries, often play the most important part in this effect. Its beauty is sometimes secured, indeed, with architectural elements that are far below the best. For example, I know of no more entrancing, beautiful, picturesque interior than that of the *Lorenz Kirche* in Nuremburg, the architecture of which is not remarkable beyond that of a dozen other churches which have not half its fame and which do not produce a tithe of its effect upon the sense. And the cathedral of Ratisbon, which sins architecturally in a hundred ways, is *pictorially* far more delightful than many almost perfect structures. He who seeks for this pictorial beauty will, I acknowledge at the outset, be disappointed at Bamberg. An artist might not choose to paint any corner of it; no emotionally sensitive person will be stirred by its aspect as such a one must be by the aspect of the Nuremburg church or the Ratisbon cathedral. Nor is it large enough to impress one by its mere size. The want of the pictorial element depends partly on the fact that the interior having been "Jesuitized" and abused to the farthest possible extent, was — about forty years ago, I think — cleared of its horrors and restored as nearly as possible to its primitive condition. As in every such case the resultant effect is cold and rather bare. Yet, though one infinitely prefers the time-worn aspect of churches like St. Lawrence, where beautiful, congruous details have gathered and where color has mellowed, yet no one who has ever seen an interior that has been worked over by the decorators of the seventeenth or eighteenth centuries into accord with their own ideas of architectural fitness can deny that in such a case the very extreme of coldness and barrenness, even the most unsympathetic "restorations" of this century are an immense improvement. They may leave not a scrap of pictorial or decorative beauty behind them, but they at least restore the structural features to sight. And these are concealed by the inventions of the so-called Jesuit decorators to an extent which makes many a Romanesque church to-day undistinguishable from a round-arched late Renaissance building.

But even had Bamberg never been either barbarized or restored it would not have had the picturesque charm of many of its later sisters. The earlier style was so much more severe, so much more solid and simple, had so much less of detail and of mystery, that its effects could never be quite so picturesque; but to the other class of observers I have mentioned — those who care for architectural features proper — this interior is most interesting. All along I have called the exterior of the church Romanesque although "Transitional" would have been the orthodox word; but although one finds pointed arches enough when one stops to look, their effect does not really alter the eminently Romanesque effect of the exterior — even of the western towers, which are much later than the others. Yet with all their openness and their groups of pointed arches they do not seem to me in *feeling* in the least akin to Gothic. And of the interior I think almost as much may be said, though pier and vaulting arches are alike pointed, and though the western apse has very high narrow windows and acutely-pointed vaulting, which is almost Gothic in feeling; but the rest of the church is not, in spite of the entire lack of round arches. The vaulting of the nave is supported by alternate piers, those which thus serve being supplied with pilaster vaulting shafts; but even this arrangement does not Gothicize the great arcade with its immense mass of heavy plain wall above. There is no triforium and in each of the spaces but a single small round-headed window high up under the vaulting. These walls must of course have originally been painted and the vaulting likewise. An old colored drawing is said to be in existence which reveals the scheme, and in cleaning the church traces of the original color were found under the repeated coats of whitewash. These are most distinct in the cells of the vaulting of the western apse. They consist chiefly of conventionalized patterns in dull red and yellow, but it is said that they also show some small figures, which though much faded are valuable as being almost the only survivors of the wall-painting of this period in all Bavaria — for they are supposed to date as far back as the building of this later portion of the church — the end of the thirteenth century.

The arrangement of the two choirs greatly detracts from the apparent size of the church. Their pavement is raised many steps above the level of the nave, and they project far into the body of the church. Each choir is equal in length to two of the great square divisions of the vaulting, while the space left in the middle of the nave is only equal to three. The transepts are at the west, not at the east, and are cut in two by the projection of the western choir. Thus from either transept or from the east ends of the aisles, one's view is obstructed by the side of the choir which rises higher than one's head. The effect as of a long nave is entirely lost and with it goes some of the general ecclesiastical feeling. There is no centre of interest in any church with double choirs and apses, and the fault is most conspicuous here, where both choirs have been made so very prominent and both are so nearly equal in importance. Yet with all its drawbacks it is an imposing interior — grand if not picturesque, and stately if not graceful; and especially interesting, as I have said, as proving how much Romanesque feeling may remain where scarcely a single round arch is in sight.

I doubt very much whether there is a single church in Germany that can rival Bamberg in the matter of sculpture — not of decorative but of truly representative work. The statues and reliefs of the exterior I have already noticed very briefly. Those on the inside are quite as remarkable and of greater number and variety. Along the sides of the eastern choir are rows of niches containing remarkable figures of apostles and prophets. These date from the true Romanesque days, while from the later, transitional time which produced the exterior adornments already described, come numerous large portrait-statues which are affixed to the walls of the nave. The most interesting is an equestrian statue now believed to be of Otto the Third — though there is of course a much more agreeable local legend which makes it that of some half-heathen visitor from the East who rode into the church on horseback and suffered in some way for the sacrilege. From this same period come also many splendid gravestones and brasses; and the series of these runs on into latest Renaissance days, showing all the vicissitudes of the art and every possible variety of treatment, from the most elaborately-executed figures in high relief down to mere outline incisions cut into the slab. The carved wood stalling of the western choir is very elaborate, containing hundreds of small figures — oddly enough most of them being knights in armor. This stalling dates from the beginning of the fifteenth century. One of the chief monuments in the church is that of Bishop Suidger of Bamberg who afterwards became Pope Clement II. With this we go back again to the transitional period between Romanesque and Gothic. It is a remarkable work, a sarcophagus of marble, covered with small reliefs. On top lies the figure of the pope, still youthful in his death, while an angel approaches to comfort him. Another most important work — one which, though late in date, is perhaps the centre of our interest, both on account of its artistic worth and of the persons it commemorates — is the great sarcophagus which stands just in the centre of the edifice, and was erected in the beginning of the sixteenth century (1499-1513) in honor of the founders of the church, Henry and Kunigunde. It is composed of limestone which is, however, almost as close and susceptible of fine workmanship as true marble. The artist was Riemenschneider — a name unfamiliar, I fear, to most of my readers, but which quickly grows in familiarity and honor when one travels a little out of the beaten track in southern Germany. Usually working in wood, though sometimes as here in stone, Riemenschneider deserves to be placed only just below such sculptors as his neighbor artists Adam Krafft and Peter Vischer. On this tomb he has carved the life-size recumbent figures of the imperial pair under a florid canopy, and surrounded the sides of the sarcophagus with reliefs depicting scenes from their lives. The most curious of these is the one where the empress is walking over hot ploughshares in order to prove undeserved her husband's jealous suspicions. Even such thrice-saintly couples seem not to have lived in peace in those troublous times! The empress's expression of conscious innocence as she daintily steps over the irons is wonderfully amusing, but not more so than the gesture with which Henry lifts his hands as though to say "To think that I could ever have suspected such a saintly being!" It must not be supposed, however, that this work of Riemenschneider's has any affinity with the grotesque dramatic force of earlier days. It is extremely refined and artistic in idea as in execution, and only a

subtile suggestiveness in face and gesture prove him akin to the rougher, more naïvely and grotesquely imaginative members of his guild.

It is impossible here even to name all the other ecclesiastical buildings in Bamberg which might claim a student's notice. Most of them are horribly disfigured by the late additions and decorations, and many are prostituted to other uses — chiefly military. Henry II himself was a good soldier, but I wonder what he would think to revisit his foundation and see these buildings serving as barracks with their original titles attached — to hear the name, for example, of the "Holy Sepulchre Barracks," or the "Carmelite Barracks" — these last once the home of a sisterhood of nuns, part of whose fine cloister still remains. One of the oldest buildings is the church of St. Jacob, a flat-roofed basilica built between 1073 and 1109. The most beautiful I should call the *Oberepfarrkirche* — that is as far as its choir and apse are concerned. The main structure is small and is plain Romanesque; but the disproportionally large and splendid east end dates from the middle of the fourteenth century and is very French in style. The polygonal apse is surrounded by chapels and its exterior arrangement is very beautiful. Inside, unfortunately, though one may still pass around the aisle and see the lower part of the work close at hand, no general view is possible. Behind the altar rises one of those huge structures of wood, stucco, paint, and gilding such as only an eighteenth-century priest could have devised. With its flaunting plaster angels and crosses and gilded rays of glory and crude, glaring colors it entirely blocks up the apse so that its effect cannot be in the least perceived. The north doorway with a baldachino supported by columns is interesting; and inside the church there is a curious madonna-figure of very early date. As the church stands on one of the steep hills which diversify the level of the town its beautiful apse is a prominent object from many points of view.

The *Michaelskirche* with the many buildings connected with it is of much interest to the historian but not of great present value to the architectural student. Founded by the same emperor that founded the cathedral, and rebuilt by the same Holy Otto, much of the later structure remains; but surely no one could guess that the great pier arches were earlier than the so-called decoration which now covers them. Though these usual wood and plaster arrangements must be earlier, I think that the actual frescoing of the building must date from the beginning of our own century. I can imagine no other period when decorators would not have been at least more ambitious. Fancy over the walls and vaulting a coat of whitewash sprinkled over with detached leaves and flowers, here and there a parrot or a dove sitting on a spray — all distributed in the most ludicrously childish way without plan or design. It looks as if it had been done by an artist in work that amused our own youthful days under the name of "*décalcomanie.*"

This church was only a part of the great foundation of Henry II — the famous Benedictine Abbey which he established, and which did such good service not only in evangelizing the neighborhood but in fostering the minor arts. Only the façade of the church is visible ("Jesuitized" of course), as it is flanked on either hand by other buildings. These also form two more sides of a quadrangle upon which the church looks down. They are now put to various municipal and artistic uses, and contain among other things a gallery of old pictures that is perhaps the dreariest, barrenest and most totally depressing to be found in all Europe. At least I can imagine none other of equal extent contains so few canvases before which one could be induced to pause. A couple of Tiépolos are all that I remember to have seen.

The library and print collection, however, are in very different case. These are housed in a more modern building in the centre of the town, and include some 2,600 manuscripts and 200,000 printed volumes, besides the Heller collection of 300,000 prints and drawings of every description. Days and weeks might profitably be spent in examining these treasures, some of which are of the extremest rarity and beauty — among them the splendid prayer-books of Henry and Kunigunde, missals with carved ivory covers, and various illuminated writings of the far-away Carolingian time. In the treasury of the cathedral are more magnificent works — missals with carved and gem-set covers, ivories of all descriptions, embroideries, and goldsmiths' products. The town seems to have been, as I have said, a centre for the workers in the minor arts during many centuries, schools for this purpose having indeed been founded by Henry II, under the control of the Benedictines. Not only in the place itself but all through Bavaria, as far south as Ratisbon and Munich, we meet with countless treasures known to have been wrought in Bamberg. Some of the most beautiful objects were gifts from the imperial pair. These of course must have been produced in other places. A portrait of Henry in his royal robes, seated on the throne, surrounded by all sorts of dignitaries, which figures as an illustration in one of the missals, is not only interesting in other ways but curious as proving that painters in every age have been alike in their travesties of current architectural forms. The columns with large masks which support a roof from which hangs a curtain behind the throne have, so far as I know, no prototypes in actual constructions. A life of the emperor dating probably from the eleventh century is illustrated with odd but expressive pen-and-ink sketches.

The visitor to Bamberg will be told by every citizen that the most important of all things to visit is the "Altenburg." If not very wise he will employ in following this advice precious time that might be better spent. If he has time to spare, however, and a good pair of legs of his own, he will be justified in making the four miles there on foot; but I do not think the visit is worth the exorbitant price he will be charged by a hack-driver. The road is very pretty and the distant view of the cathedral is worth while; but the Burg itself is merely one of those ancient defensive structures with keep and chapel such as are found all over Germany. It is very old but its date is not known and it presents few really architectural features.

I will conclude with a citation from a local chronicle which shows the terms upon which old-time architects undertook their labors. Hans Forscheimer was named city architect in 1452, with the obligation to supervise all the wood and stone buildings of the town as well as inspect its pavements. He might undertake no building in other places, but he was not to be obliged to put his own hand to any actual work except upon payment of what is curiously called "special drink-and-bath money." For these services he was to receive free lodging for himself and his wife, with exemption for both from local taxation, and for him from service as night-watchman, public laborer, or soldier. And he was to receive £35 a year in money and £8 additional for the exercise of certain duties which seem to have been those of inspecting the condition of buildings already constructed. This Forscheimer was the architect of the Rath-Haus and of the principal bridge.

As in almost every German town there is a good local hand-book of the antiquities of Bamberg. It was apparently out of print when I was there, but can undoubtedly be secured by more fortunate future visitors.

M. G. van Rensselaer.

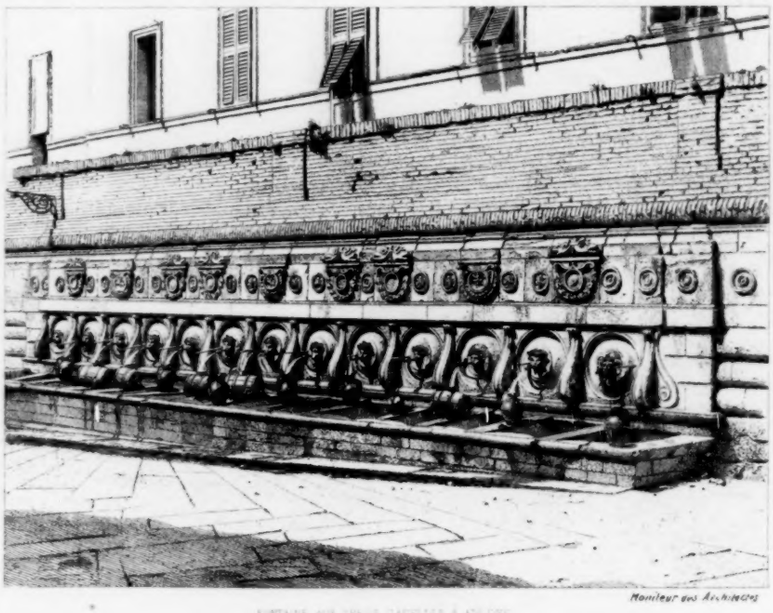
THE ILLUSTRATIONS.

PETERBOROUGH CATHEDRAL.

[From the *Building News.*]

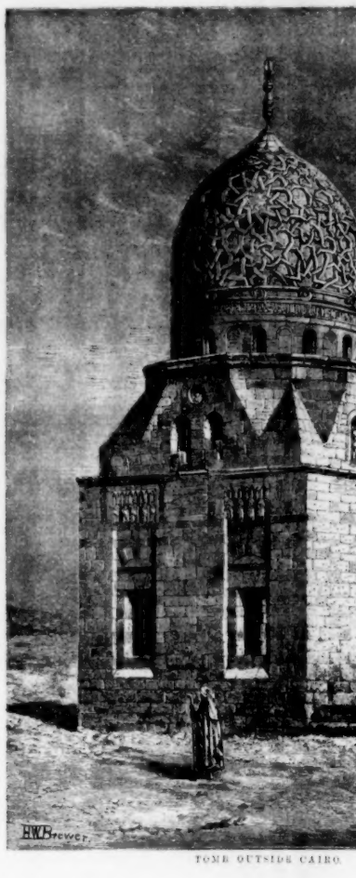
THE history of Peterborough, like that of Gloucester, Westminster, and several other of our cathedral structures, is that of a great Benedictine monastery church, converted by Henry VIII into one of his new cathedrals. The narrative of its rise carries us back into the uncertain mists of the seventh century, when Prince Oswy, ruler of Northumbria, and Peada, son of the King of Mercia, are said by the Saxon chronicle to have met (in 655) and agreed to rear a minster to the glory of Christ and the honor of St. Peter. The monastery is believed to have been the first established in central England. It and the fen-land town which it adjoined were known for more than four centuries afterwards as Medehamstede, its present name of Peterborough being a comparatively modern appellation. A very large portion of the building is of Norman character, gradually advancing to Early English from the east end of choir to the west end of nave. The unparalleled west front, pronounced by Ferguson to be the grandest and finest portico in Europe, is of the purest type of Early English work, while the chapel, inserted into the central arch of this porch, and the great retro-choir or "new building" at the east end are Perpendicular. The entire building is constructed in a close-grained and durable freestone from the neighboring quarries of Barnack, by Stamford. The old monastery church having been destroyed by fire, Abbot John de Seez commenced (1118–25) the present choir which was completed by the next abbot but one, Martin de Bec, 1133–55. The eastern end, like the slightly later one by Herbert de Losinga, at Norwich, is apsidal, and is inclosed by the "new building." To this pure Norman period belong the eastern arches of both transepts, the rest being the work of Abbot de Waterville, 1155–77, who built the central tower as a lantern of four stages. Insufficient means were taken, however, to ascertain whether the foundations and piers could bear the weight — a very common negligence with architects of the twelfth century — and in consequence of the impending failure of the piers, the lantern was taken down nearly as far as the crowns of the great arches; the east and west arches were altered from semicircular to pointed, but the Norman arches opening into the transepts still exist. Pointed hoods were inserted above these two round arches, in order to remove the weight from their crowns, and the original Norman columns and capitals were left, although adapted to the new work. The lantern now being demolished appears to have been built about 1340, and has two lofty windows on each side, filled with Decorated tracery, and between and beyond these on the exterior is a blind arcade richly treated. The nave was commenced

COPYRIGHTED 1888 JAMES R. OSGOOD & C



Moniteur des Architectes

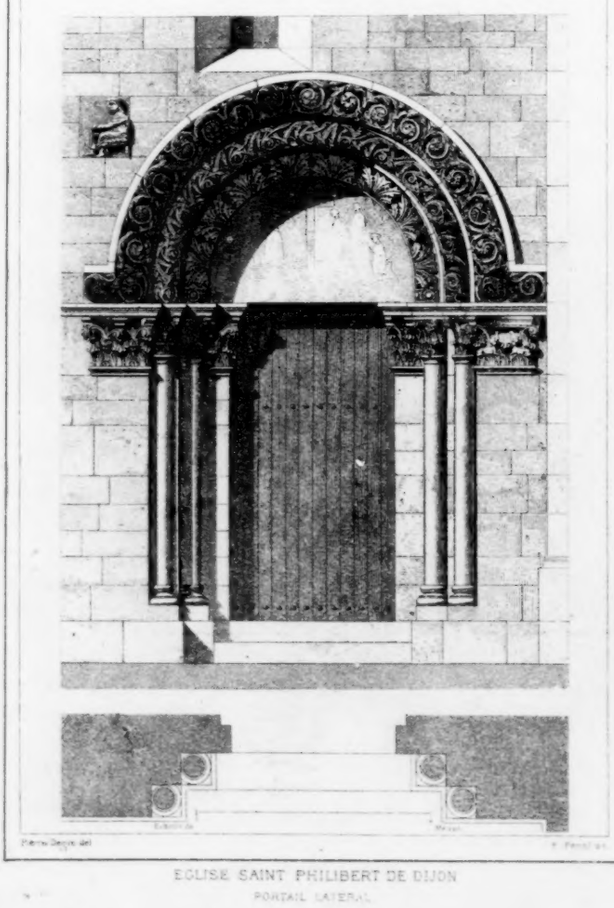
FONTAINE AUX TROIS TARASQUES À AUXONE



TOMB OUTSIDE CAIRO.

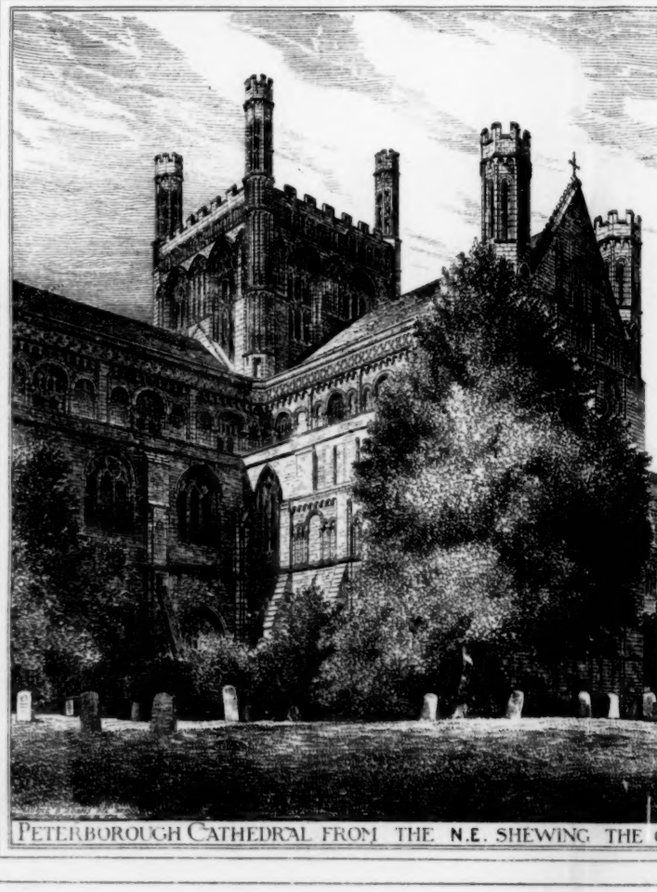
OUR FOREIGN EXCHANGES. XIII

ENCYCLOPEDIE D'ARCHITECTURE



EGLISE SAINT PHILIBERT DE DIJON

PORTAIL LATERAL



PETERBOROUGH CATHEDRAL FROM THE N.E. SHEWING THE

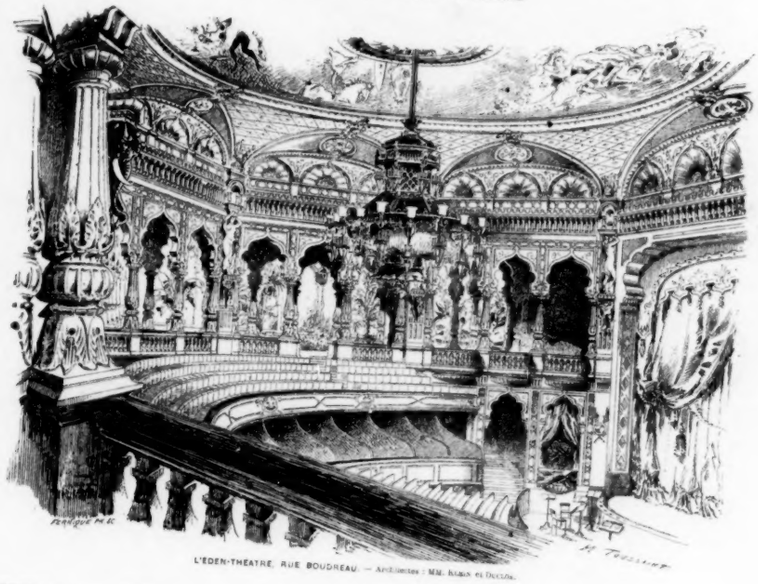
Heliotype Printing Co. 211 Tremont

ESS. JAMES R. OSGOOD & CO

OUTSIDE CAIRO.

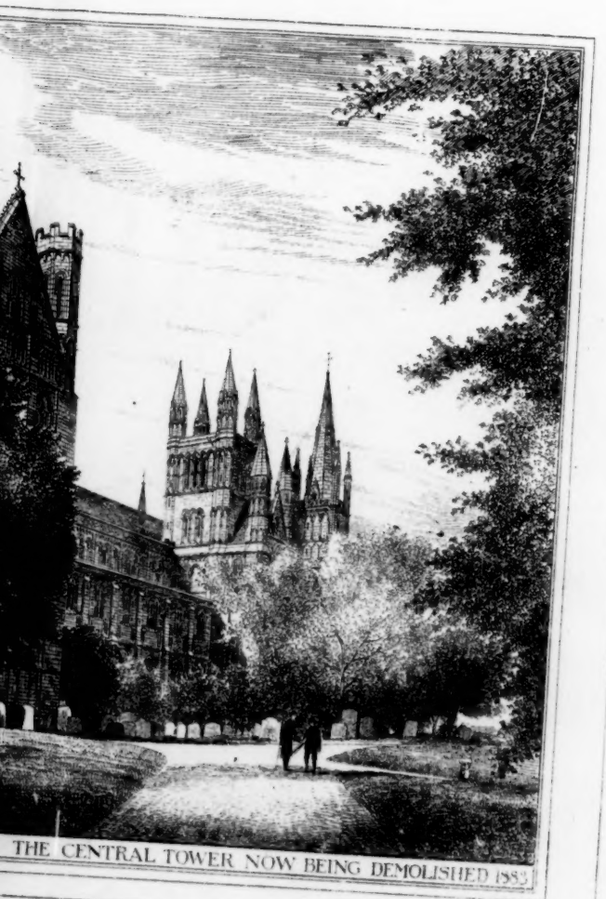
The Builder

NOUVEAU THÉATRE A PARIS



L'EDEN-THÉATRE, RUE BOUDREAU. — Architectes : MM. Klein et Dutert.

LA SEMAINE DES CONSTRUCTEURS.



THE CENTRAL TOWER NOW BEING DEMOLISHED 1883

The Building News

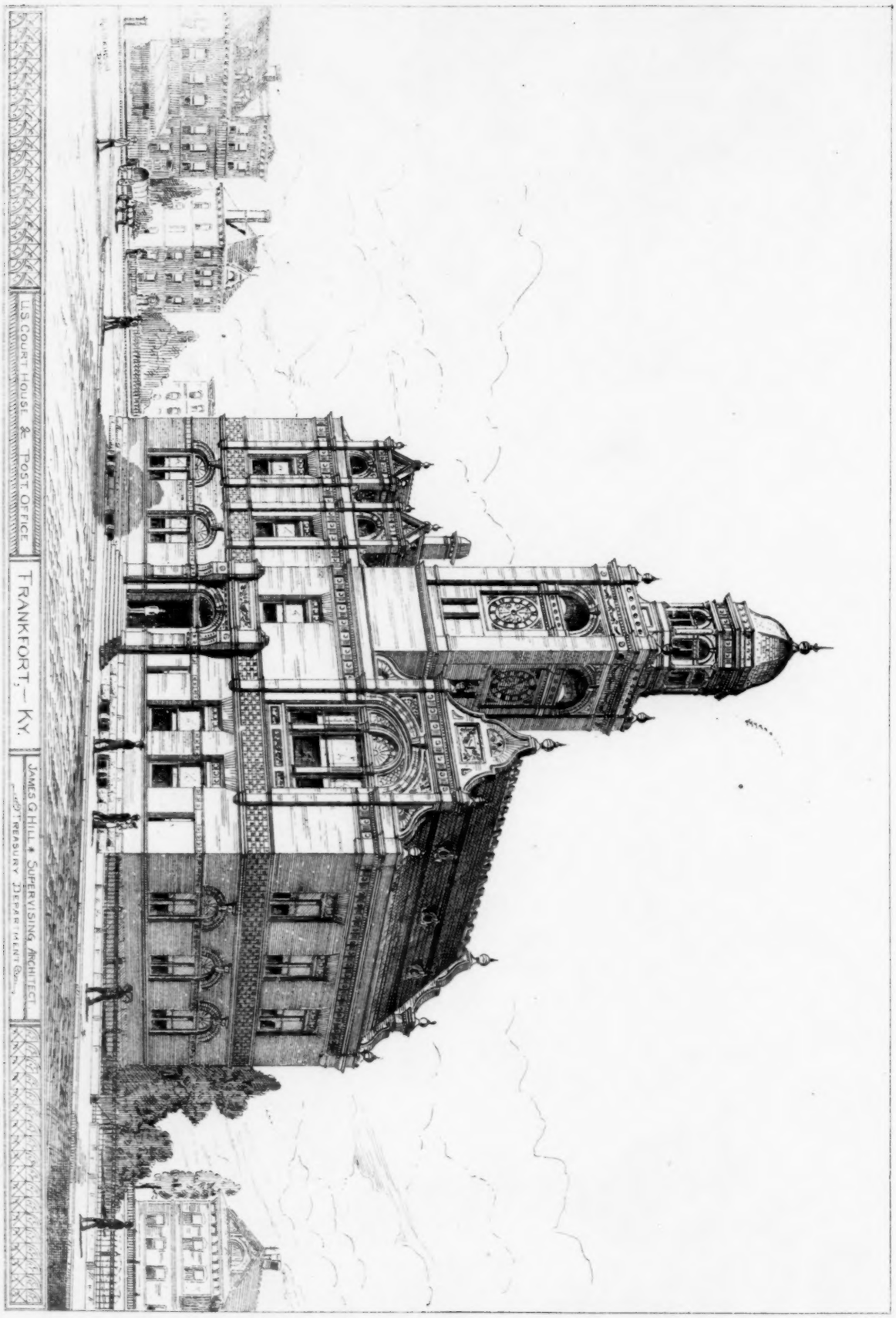
NOUVEAU THÉATRE A PARIS

L'EDEN-THÉATRE, RUE BOUDREAU. — Architectes : MM. Klein et Dutert.

LA SEMAINE DES CONSTRUCTEURS

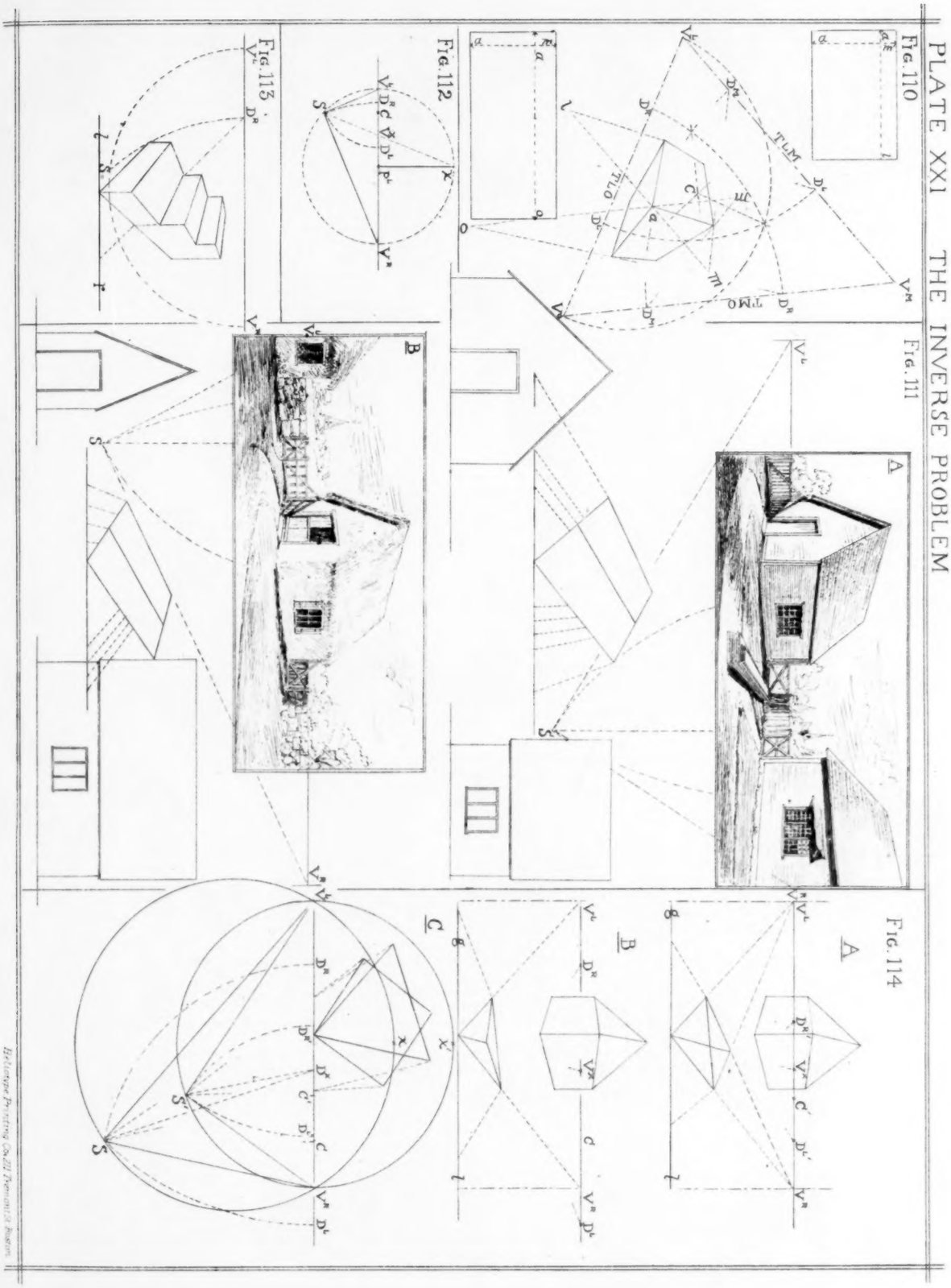
TREMONT ST. BOSTON.

COPYRIGHTED 1883, JAMES R. OSGOOD & CO



COPYRIGHTED, 1883, JAMES R. OSGOOD & CO.

PLATE XXI THE INVERSE PROBLEM



Heliotype Printing Co., 211 Devonshire St., Boston.

by Abbot de Waterville, and was carried westwards by Benedict, 1155–93, and has often been compared with the neighboring and nearly contemporary naves of Ely and Norwich. It is slightly later in style, and considerably longer, wider, and loftier than either of those, while the effect is more massive. At the west end are Transitional western transepts, and beyond these the rich thirteenth-century west façade already referred to. Inclosing the ancient apsidal end of the choir is the "new building," a long parallelogram of five bays, forming a third transept, like the much earlier eastern one built at Durham. It was built between 1438 and 1528, and is covered-in with rich fan-vaulting, flatly treated, without pendants.

Evidences of weakness and instability have for many years shown themselves in the masonry of the central tower, and fresh proofs of their existence have frequently been the cause of much anxiety to the Dean and Chapter, although Sir Gilbert Scott's recommendations as to the necessity of dealing with the dangerous character of the structure were, from time to time, set on one side, either for want of funds or for want of energy. "For a very long time," he writes, "the Chapter (with one brilliant exception) did all in their power to shut their own eyes and those of the public to the truth, and called in another architect, who preached 'Peace, peace!' They sent for a third, and he at first was almost carried away by their dissimulation, but at last was obliged to admit the danger." Considerable expenditure was then undertaken in underpinning the north aisle of the nave, under the direction of Sir Gilbert Scott; but the general subsidence of the building towards the north had considerably increased the weakness of the tower, which had also suffered through the vain endeavor, made many years before, to hold up the south transept front from leaning outwards by strapping it to the tower walls by means of ties formed of large beams, which are laid in the passage-ways of the triforium and clerestory on both sides of the transept. The sinking thus sought to be remedied has continuously gone on notwithstanding, and consequently the rents in the tower have gradually grown worse. This critical condition of the lantern was rendered the more serious by the failure of one of the four great piers which carry it. The pier, that at the southeast angle, is split, more or less, from the top to the bottom, being only held together by wood-work and numerous iron bands; but in the pillar itself the evidence of settlement is not so distinctly marked. The foundations at this point do not seem faulty, for the pier from the ground-line to the organ-gallery level shows no actual settlement. Above this level the compression increases upwards, showing that the failure of the column is chiefly due to the crushing of the rubble core. The north aisle of the choir, long in a sadly decrepit and sinking state, had to be shored with timber, while the foundations throughout the cathedral were of the most faulty description. The site itself is a bad one, owing to its extremely water-logged nature. Indeed, the Chapter just now have to contend with difficulties of no usual character, and the agricultural depression throughout the diocese at the present time is likely to somewhat cripple their already limited resources.

Sir Gilbert Scott, in Dean Butler's time, underpinned parts of the church towards the northeast, and, later on, he did the same to the eastern aisles of both transepts, also adding buttresses to them. Some of the Chapter wanted to go beyond Scott's ideas by building flying buttresses against the north wall; but ultimately this proposal was abandoned, and the matter has been allowed to remain in abeyance. The successful underpinning of the towers and rebuilding of the weak piers of their substructures at Ripon and St. David's, as well as, later on, at St. Albans, carried out by Sir Gilbert Scott, furnished experience and examples well suited for the remedying of the causes for alarm at Peterborough; but limited resources are pleaded as the reason for delay. Early in the autumn of last year, the Dean and Chapter consulted Mr. J. L. Pearson, R. A., as to the condition of the central tower, and subsequently (early in November) his report was printed and circulated in the diocese. An influential committee was formed, headed by the Marquis of Exeter, to carry out the recommendations of the report, and early efforts were contemplated for obtaining the funds necessary for rendering the central tower secure by rebuilding the southeast pier. Mr. Pearson does not seem to have considered the danger so imminent as circumstances have since proved it to be. A day or two after Christmas fresh cracks were observed and old fissures were enlarging, portions of stone were dislodged, while the whole upper stage of the tower, long ago much shattered, seemed to be moving towards the north. Mr. Pearson was summoned by telegram to make a personal examination, and on the first day of the new year he unreservedly condemned the tower as unsafe, and recommended that the choir services should forthwith be discontinued, as it was, in his opinion, quite impossible to say when or how the state of movement in which the tower was might not be seriously accelerated. He further advised that the whole, or nearly the whole, of the upper portion of the tower should be speedily removed, in order that the arches of the crossing and their piers might be at once relieved of as much weight as possible, and also to prevent any of it giving way suddenly and cutting through the roof to the floor below. Mr. Pearson expresses extreme regret in this report that so complete a demolition should be necessary, but adds that the recently-increased settlements leave no choice in the matter. Early on Tuesday, the day after these recommendations had been received, by the instruction of the Dean, a large body of workmen were engaged in screening off the tower from the nave, and in the necessary preparations for fitting up the western portion of the nave for divine service, this work being entrusted to Mr. John Thompson, of Peterborough, the builder who restored Chester and carried out the work already referred to at Ripon. The same contractor is now engaged in taking down the central tower, under the immediate supervision of Mr. Pearson, he also having underpinned the north aisle of the nave for Sir Gilbert Scott. Blore's screen, erected in 1830 across the entrance to the choir, will be removed as soon as the other work necessary to be done will allow; but it is contemplated that at least a month will elapse before this organ-screen can be taken down. The organ has already been removed, and has been re-erected in the north aisle of the nave. A platform of wood has been placed across the tower, about fifty feet from the top, where stones of considerable size have become loose, some having broken away altogether. The stone pulpit erected in memory of Dr. James, a former canon of the cathedral, has been removed at the cost of the family of Dr. James, who at once generously offered to bear the outlay, both for its removal and re-erection. Originally, a lofty and massive lantern of four stages existed here, and it has been suggested that the fine central tower at Castor, some four miles distant from Peterborough, furnished the type of Abbot de Waterville's design (1155–1177). This tower subsequently proved too heavy for the central piers to support, and in order to prevent the repetition of a similar disaster as had already happened at Ely and at Winchester, the fall of the tower at Peterborough was averted by its being speedily pulled down nearly as far as the crown of the great arches, as we have already mentioned. The existing lantern, having vaulting-shafts of wood in groups of three, has a lierne roof with a central boss representing the Saviour holding the globe. The wooden vaulting was adopted for the same reason which determined the necessity of a light form of stone construction, in order that the mischief already effected by the Norman tower might not be needlessly aggravated. The triforium and clerestory arches adjoining the crossing had already been much crippled by the old settlements, and much ingenuity was displayed by the fourteenth-century builders in the expedients of which they availed themselves for the purposes of lighting their new structure. Two lofty windows on each side are filled with Decorated tracery, and, by deeply recessing the lights on either side, richness and slightness were readily secured. The date given to the erection of this lantern is 1350, though there is some uncertainty as to the exact year. At first, it was surmounted by an octagonal stage in wood, somewhat in the form of a dwarf imitation of the big lantern at Ely. Old pictures show this; and King's etching published in the "Monasticon," and by Browne Willis, giving a "North Prospect of Peterborough," clearly illustrates this structure. It also shows the present central tower proper, as originally built, the tall turrets now existing at the four corners being comparatively recent additions, erected by Dean Kipling at the beginning of the present century to "increase its height and dignity," and these were long known as "the Dean's chimneys." It may be interesting to note that the level of the floor under the tower is barely 28 feet above Ordnance datum, and it is nearly level with the ground-line of the alluvial site on which it stands. Including the modern pinnacles, the tower rises about 150 feet high above the ground, and only some 20 feet higher than the ridge of the nave-roof, and not even the summit of the building can be seen from the sea. The view which we publish to-day illustrates the aspect which Sir Gilbert Scott so much admired, of which his characteristic anecdote respecting two impressionable friends whom he had brought to see the building from this point is apropos. The tale runs that Scott's first friend exclaimed on seeing it, "Oh, how charming! What more could one desire than on this spot to die?" The second, and more prosaic friend replied with some warmth that, "With him quite a contrary feeling was inspired by the sight, which only induced the more firmly his very considerable desire to live."

TOMBS AT CAIRO.

[From the *Builder*.]

PERHAPS the most remarkable structures at Cairo are the tombs of the Caliphs and the Mameluke kings. They are for the most part situated in two large groups outside the walls of the city. There are, however, others, and those probably the earliest in point of date, within the walls of the city; one of the latter is the only existing tomb of what was formerly a large group erected to the memory of the caliphs of the Eiyoobite dynasty. The Caliph Eiyoob, whom this monument records, died in 1250. Why all the others of this group have been destroyed it is difficult to say.

The beautiful tomb which we illustrate is one situated outside the city walls, and forms one of that group called "El Kaitbay" from Kaitbay or Kâëdbai, being the most important Sultan of the dynasty which these edifices commemorate. Sir Gardner Wilkinson calls these the tombs of the Circassian Mameluke kings, and informs us that the first Sultan of this dynasty was El Bêrkook, who repulsed the Tartars under Tamerlane in 1393. The largest of these tombs, that to Sultan Kaitbay, dates from the year 1496, and is a rich example of Egyptian Pointed architecture, though from having had a large mosque attached to it, it is less symmetrical than the example which we illustrate, and wanting in the simple dignity and beauty of the latter. Like all Mahomedan buildings, it is quite impossible to judge of the date from its style; it looks, at first sight, to be earlier than the Mosque of Touloon, which is more decidedly Gothic, and has the pointed arch far more strongly developed, yet if the dates

ascribed to these monuments are correct, Touloon is five centuries, at least, earlier! The date given to the Mosque of Touloon, 879, seems almost incredible, even allowing for the stagnation of Mahomedan art, and we should not be in the least surprised if some one were to discover that no portion of the present building was in existence before the year 1100. It used at one time to be supposed that the Temple of Denderah was a work of the time of Rameses the Great, but now we know positively that it could not have been erected before the time of Trajan.

We do not for one moment say that this is also the case with the Mosque of Touloon, because we have no means of ascertaining the facts concerning that building, but we repeat that we should not be surprised at finding that it dates from the twelfth instead of the ninth century. Even if this were the case, it would still be doubtful whether Cairo may not claim to have been the first city in the world where a "Pointed Style" was developed. The whole question is one of considerable interest, and the examples of Mediæval architecture are so remarkable, so singularly beautiful, and offer so many hints for design, especially as regards domical construction and the use of the dome in combination with the pointed arch, that they deserve to be most carefully preserved and protected, and we venture to suggest that the English nation should not let slip the present opportunity of impressing upon the Egyptian authorities the duty of preserving these beautiful monuments. They have in past times been most shamefully neglected; in fact the tombs outside Cairo have served as stone quarries, and nothing has been done to protect them from destruction. It seems strange that the present rulers of the country should have exhibited no respect or reverence for the tombs of their ancestors.

THE UNITED STATES COURT-HOUSE AT FRANKFORT, KY., MR. JAMES G. HILL, ARCHITECT.

PERSPECTIVE DIAGRAMS.—PLATE XXI.

FOUNTAIN OF THE THIRTEEN SPOUTS AT ANCONA, ITALY.

[From *Le Moniteur des Architectes.*]

SIDE PORCH OF ST. PHILIBERT, DIJON, FRANCE.

[From *L'Encyclopédie d'Architecture.*]

THE EDEN THEATRE, PARIS, MM. KLEIN & DUCLOS, ARCHITECTS.

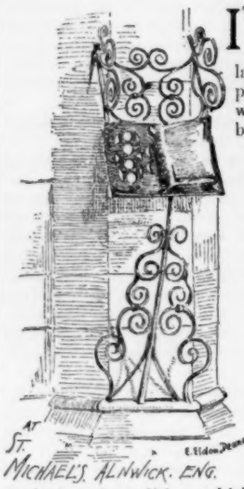
[From *La Semaine des Constructeurs.*]

THE façade of the new theatre is full of movement without having fallen into historical extravagance. The lower story is solid and rather dwarfish. It gives approach to the entrance vestibules, which are lighted just enough for one to see his way clearly, and have no luxuriance of ornament, in order that the effect of the decorations seen from the grand staircase may not be diminished. The first story is pierced in the middle by a group of three windows, and by a pair of coupled windows at each side, which correspond with the arrangement of the *foyer*. The bays beyond this on either side light the staircase. The only color employed on the exterior is furnished by some columns of red Scotch granite, and some borders of Venetian enamel, which serve to break the monotony of the coloring. The only other color is furnished by the stained-glass windows when the theatre is lighted at night.

If the façade is sober, the interior is not. Here everything is brilliant and glittering with light. There is not an inch of wall-space which is not painted, gilded or covered with glass enamel. As in the façade, the motive of decoration has been borrowed from the Orient. The grand staircase ascends from the vestibule right and left, unites, and ascends in a single run to the first landing, then separates, and proceeds in two narrower runs to the *foyer*. This occupies the whole breadth of the building, except the two extreme bays. The decoration of the *foyer* is in tones of brown, and gilding is freely used. The ceiling is divided into three compartments. Three chandeliers light the vast room. From the *foyer* one can see, either directly or by the reflections in mirrors, the entire interior of the edifice. The axis of the auditorium is in the same line with the axis of the *foyer*. These two portions of the edifice are separated by an open corridor. To the right of the auditorium is a large rectangular room which is styled the "Indian gallery," and at the left is a conservatory of the same dimensions. Rows of columns bound together by light and graceful arcades mark the general divisions of the building, leaving everywhere large openings through which the eye wanders at will. The architects have adopted the best methods of construction which would allow them to attain the effect which they desired. The whole structure is of iron, but all the metal-work — columns, vaults, ceilings, etc.,—has been encased with stucco.

The decoration of the auditorium is in more brilliant tones than that of the *foyer*. The ornamentation of the "Indian gallery" is in harmony with that of the stage and the *foyer*. The conservatory is composed of a metallic frame-work independent of the lateral walls, and covered by glass slightly opalescent in tone. The walls of these two rooms are coated with glass which offers an illusion of infinite perspective. The auditorium is octagonal—the proscenium arch occupying one side of the octagon—and will seat about 1,500 persons. The only boxes are a few stage-boxes, and the *baignoires* below the gallery. The corridor is lighted by large lustres, the shades of which are of yellow glass, from which it results that the light corresponds with the general tone of the decoration of that portion of the building. The "Indian gallery" and the conservatory are lighted by Siemens's electric-lights, these introducing a third tone in the illumination employed. The stage is about as deep as that of the New Opéra, and is large enough for 500 or 600 performers. A stable for fifty horses has also been introduced. The cost of this building, which was erected with the most astonishing rapidity, was only about one thousand francs per square metre.

NEW BOOKS.



IT is a very encouraging stage in the progress of the civilization of a country when it is found worth while to formulate its practices in any branch of employment, for the sake of eliminating what is proved by careful examination to be bad, as well as of putting in practicable working form the teachings of experience. Until such a time has come everything is done tentatively, or else the formulas that apply to conditions existing in other countries are employed without reference to their applicability to different conditions. Seemingly, such a time has come when it has been found worth while to examine the constructive sciences as practised in America with a view to preparing text-books which shall, to a degree, take the place of the excellent standard English, German and French text-books which have hitherto been used, but which are always found only one tithe part as useful as they might be, because they deal with materials, methods and conditions which do not obtain here.

The American engineer has long had an acknowledged standing in the scientific world, and his performances are studied and his dicta listened to with as much respect as any one's, and it is only natural that the literature of American engineering should be at once more voluminous and more intrinsically valuable than the literature of American architecture. Comparatively few works on architecture have ever been written or compiled by Americans; the majority of so-called architectural works published here being mere collections of illustrations, whose real object is less to improve the public taste, and still less to afford real aid to members of the profession in their struggle toward higher achievement, than the advertising of the personal prowess of the author, and though the catalogues of some publishers contain a fairly long list of American architectural works, the proportion of grain to chaff is very small. The reason for this condition of things is that until within a few years there have been comparatively few men whose attainments qualified them to undertake any literary work, and these few have been too absorbed in the active exercise of their profession to be able to do so; and more largely because the necessity for such work was not very pressing, thanks to the abundance of good architectural literature produced in the mother country in the past and in the present, where the average attainment of the profession is higher than it is here, and the supply of hands for active professional work is so much larger in proportion to the demand, that many men find it desirable to eke out their income by writing—even if they do not permanently adopt the pen rather than the pencil,—and where the encouragement is the greater in that they are addressing an audience whose acquirements have not been attained in quite the "from hand to mouth" manner in which too many American practitioners are trained.

The most noticeable American book treating of the higher and more abstruse architectural questions is Mr. Eidlitz's "Nature and Functions of Art," but it stands almost the only example of its class. The American mind is practical before it is philosophical, and if Mr. Eidlitz had been a natural instead of a naturalized American his book might have had a less philosophical cast.

The most valuable American books are those which take up the practical questions of the profession, though they are less valuable than they well might be, from being what may be called rather empirical in their treatment, and it is a great advance that now men of thorough scientific training are finding it worth their while to interest themselves in book-making, though most writers of this class are trained in schools of engineering, and consequently approach even those problems in which architects are interested from the engineer's point of view. However, until an entirely satisfactory substitute has been prepared, the American student can use to advantage the admirable "Notes on Building Construction," compiled for the use of those who are to pass the examination of the Science and Art Department at South Kensington.

Certain chapters in Professor Thurston's "Materials of Engineering"[1] will, so far as the subjects of which they treat are concerned, provide such a substitute, more satisfactory and more reliable than can be found in any American book that has yet appeared, and though the book is conceived from the engineer's standpoint, it is of more practical value to the architect than such books are apt to be. The formulas are simple, the language very concise, intelligible and direct, and the arrangement logical. But its chief value lies in the fact that it is American and deals with American materials of the

[1] *The Materials of Engineering.* In three parts. Part I: Non-Metallic Materials: Stone; Timber; Fuels; Lubricants, etc. By Robert H. Thurston, A. M. C. E. New York: John Wiley & Sons, 1883.

well-known merchantable sizes and shapes, called by familiar names, and measured by the accepted standards, so that the student is saved the weary labor of translating into the vernacular, foreign terms and statements based on foreign usages, as he has so long been forced to do when using similar foreign standard text-books. Moreover, its correlation with foreign text-books has been to a degree preserved, as almost all measurements and tables are given with English and metric equivalents.

Of the six chapters contained in the first Part—all that has yet been published—those on fuels, lubricants, and the one on miscellaneous materials (belts, friction, etc.,) do not at all concern the architect, but the others, only one hundred and fifty pages to be sure, treating of Stone and Cement, Timber and the Strength of Timber, are more than ordinarily valuable, in that they are first of all, American, and next, that to a considerable degree they embody the results of Professor Thurston's careful experiments on timber. Besides noting the results of his own experiments the results of other American observers, Hatfield, Lanza, Woodbury, and others are given, often in tabular form, and also statements of the tests made with full-size materials by the great testing machine at the Watertown arsenal, so that we believe we are safe in saying that the book contains, so far as timber is concerned, the latest information brought down as far as the beginning of Professor Lanza's very valuable and practical experiments on full-size timber, which are still going on.

One of the most interesting features of the book is a descriptive and tabulated account of the various processes of preserving timber.

A very excellent example of the other class of American text-books which we have styled above, somewhat too slightingly, perhaps, "empirical," has been prepared by the editor of the *Builder and Woodworker*,[1] who has had the happy thought to gather together the many items of information, disjointed facts, and stray tabular statements that are continually passing under the eye of an editor, and he has been careful to explain that little of the matter is original. This being so, it is rather a pity that he has not given more frequently than he has the sources from which his information has been derived, instead of simply enumerating in his preface those authorities from whom many of his facts are borrowed.

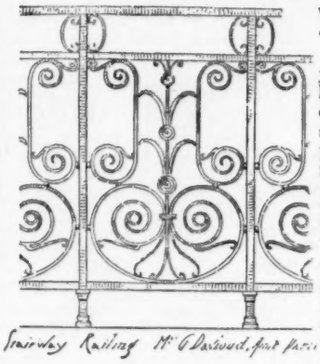
The chief function of the book is to aid a builder in making an estimate, and the tables of materials and labor, which give the cost in approximate figures, with a column in blank at the side, in which actual prices can be noted from time to time, are really valuable, and so far as we know are unique; but they have the disadvantage of being based mainly on New York materials and prices, instead of being extended so as to take in the other sections of the country. This drawback affects also the value of the rules given for the measurement of work. But the book will afford a useful starting-point, and is one which has long been needed; and if any one will take the trouble to interleave the book to give space for his own notes, and rebind it, he will then have as serviceable a hand-book as can be desired. This could be done by omitting the "glossary of architectural terms," which occupies fifty pages about as uselessly as could be accomplished. We should really like to know where Mr. Hodgson found this glossary, for we will do him the justice to believe that he found it "ready-made"; we cannot imagine that any sane person could be so foolish at this day as to prepare for the use of carpenters and builders such a farrago of useless, unusual, and altogether nonsensical terms as have been laid before the purchasers of this book as part of the every-day conversation of architects. No wonder that "practical" men have a quizzical contempt for architects, if they imagine that the latter interlard their instructions with such words as "alipterion," "asarotum," "bursa," "camarosis," "catabasion," "cataconeum," "chartophyacium," "cimeliarch," "laura," "pampre," and a host of similar ones. Can any of our readers give a definition of a single one of these terms without first referring to a dictionary?

A very useful chapter, inasmuch as architects very often are carrying on work in different States at the same time, contains an abridgement of the lien laws now obtaining in the several States.

Probably every carpenter thinks he knows everything about saw-filing, and he can hardly need a very deep knowledge of the higher mathematics to enable him to set his saw for cross-cutting or splitting, but if he could find time to read understandingly Mr. Grimshaw's little treatise on Saw-Filing,[2] he would find that there was infinitely more in the matter than was ever dreamt of in his philosophy. We do not profess to have mastered it, as we prefer to have our saws filed and set in some remote place, that the nerves connected with our front teeth may be saved unnecessary wear and tear; but we can perceive that the matter is intelligently discussed and is certainly amply illustrated.

As we believe few architects are interested in mechanical engineering, we feel that there is little need of saying much more about Mr. Smith's book on Cutting Tools[3] than that it deals scientifically with all varieties, simple and compound, of saws, planes, chisels, files, lathes and drills, and is fully illustrated.

AN OLD CURIOSITY-SHOP.—THE TUILERIES.



Stairway Railing M. C. Dariaud, first part.

THE Tuileries, which has long been an eyesore or a charm to Paris, just as you like to look at it, is at length going to be pulled down. The contract has been signed, the workmen are there pick in hand, and in eight months by the card nothing will remain of these eight centuries of souvenirs of the historic greatness of France. They will all be carted away as rubbish, at least so much of them as the collectors have spared, and the collectors are already very busy. The contractors themselves are going to open an old curiosity-shop in the grounds, and the wealthy amateur is trying to intercept the best things on their way to the shop. He has dug his taster into the solid stone walls for bits of choice ornament, as though it were so much cheese, and he has entered his name on the books for morsels of ruin he is not yet able to reach. The remains of the Tuileries will probably cut up into as many souvenirs as the wreck of the Royal George. There is enough for everybody, and there is variety for the most diverse tastes. You may buy anything, from an entire stone staircase to a bit of broken looking-glass. Yet at a first glance you might think that there was nothing left; the interior seems an utter ruin. The great staircase under its load of débris is simply a hill of rubbish, but the pillars at the sides are intact, and so are the friezes and cornices, most of them perfect specimens of the Louis XVI style. Here the amateur aforesaid has already dug out an ancient helmet carved in low relief, but much remains behind. The columns could be taken away bodily, and they would make a fine rustic temple for garden or park. Mr. Worth has already shown what may be done with such things at his place at Suresnes. Long ago, in the time of the Commune, he bought up what he could find "for an old song," and, with his skill in working up materials, made as pretty a ruin of them as you could wish to see. They say he cries there sometimes over dead fashions, or finds his most solemn inspiration for new ones. It is a *via sacra* that recalls his most distinguished customers. Still for majesty of association he has nothing like the staircase of the Tuileries. At the head of this you come to the Salle des Maréchaux, a most complete wreck. It must have been a perfect barrier on that fateful day. Experts will tell you that there is every sign of fiercest raging fire. Only a stone shell remains; the floors, partitions, cornices, everything once standing between earth and sky, is gone. It is not quite so bad as that in any other part of the building. A few supports in iron-work, so twisted that they seem still to writhe in the flame, show where once the gallery ran. Add to these a little gimcrack shield or two inscribed with the names of great battles, and that is all. These show where the effigies of the marshals were cremated, for each marshal had his shield. The Jena shield is intact, and there is another which once bore the name of Marengo, though it is half burned away. Both of these are already sold. Mere paint sometimes survived where wood and iron, and even marble, were burned away. "*Honneur et Patrie*" is still to be seen over the door in black letters on a gold ground. Beyond this there is nothing, nothing, nothing. It must have been like the fire of five hundred blast-furnaces. There are places where the stone has crumbled to powder in the flames. Oh, the sight for the bird that hovered above on poised wings! The Salle d'Honneur near by is a more orthodox ruin. It is not burned clean out like the other; there are remains. The iron girders nearly gave way; they are bent concave where they were before convex, but still the fire got tired first. All the floor here is a grass-grown slope; the ghosts of courtier shepherds might revisit it to tread a rustic round. The chimney is left, and it is in very good condition. It might be taken away bodily and set up in some country hall; it would hardly do for anything smaller. The flooring beneath it is burned away, and it is perched up by itself in the air in the queerest fashion. In one of the upper rooms there is a little solitary flower-pot hanging in the same semi-miraculous way, between earth and sky.

The exterior offers the richest harvest to the collector. Here, especially in the front facing the Arc de l'Etoile, there is a good deal left: ever so many columns in different styles, and statues, with some balconies in modern iron-work. The fire does not seem to have been overpowering here, and it has left one unique construction in all but perfect preservation — the *perron* or little staircase of the Emperor, by which the imperial family used to reach the garden from the private apartments. This is in iron, and has a double

---

[1] *The Builders' Guide and Estimator's Price-Book.* Being a compilation of current prices of lumber, hardware, glass, plumber's supplies, paints, slates, stones, limes, cements, bricks, tin and other building materials; also prices of labor and cost of performing the several kinds of work required in building. Together with the prices of doors, frames, sashes, stairs, mouldings, newels, and other machine-work. To which is appended a large number of building rules, data, and useful memoranda, with a glossary of architectural and building terms. By Fred T. Hodgson, editor of the *Builder and Woodworker*. New York: The Industrial Publication Company, 1882.

[2] *Saw-Filing:* A Practical Treatise in Popular Form. By Robert Grimshaw. With many illustrations. New York: John Wiley & Sons, 1883.

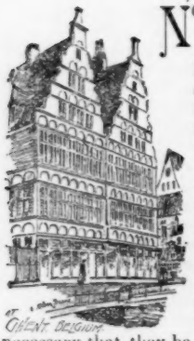
[3] *Cutting Tools worked by Hand and Machine.* With fourteen folding plates and fifty-one wood-cuts. By Robert H. Smith, M. I. M. E., Ass. M. I. C. E. Cassell, Petter, Galpin & Co. London, Paris and New York: 1882.

flight, with a gentle curve. It might be taken just as it stands, and with a few repairs it would be as good as new, or, for the collector's purpose, considerably better. This will probably fetch a high price. The minor curiosities, or what one might call the portable ones, are being snapped up day by day. The Louis XVI clock in the Place du Carrousel is gone, — disposed of by private sale. It stopped at a little past nine, so something very decisive in the fire must have happened just then. Even the walls might be sold stone by stone as memorials, and some of these would have a double value, for they are of archæological interest as well.

The building exhibits half a dozen different styles of house construction. An expert will tell you that such and such iron-work or stone is sixteenth-century, and that one bit of wall is twice as old as its adjacent parts. It was very "composite" indeed, and every occupant has left his mark upon it. One ancient style is seen in walls that are merely veneered with stone, and have all the space between them filled with a kind of concrete — the poor, feeble beginnings of jerry-building in the time of Catherine de Medicis. In our day they would have left the concrete out. The way to the upper towers lies across yawning chasms of ruin bridged by planks. The winding stair has been turned by the drift rubbish almost into a winding causeway. The view from the top well repays the trouble of the ascent; you see Paris as you can see it from no other point in the capital — the whole stretch of the Champs Elysées in pure perspective, and the river hard by.

The Tuileries had its ghost, and it was a local, not a family spirit. This is a nice and important difference, and the want of due attention to it has sometimes led to difficulties. A friend of the writer, who had taken chambers in Lincoln's Inn, on the express understanding that they were haunted, was disgusted to find that the ghost disappeared with the late occupant. He was in the nature of personal property, it appears, whereas the new tenant thought that the use of him was included in the purchase of the fixtures — that he was "in the walls," in fact, with other visitants of the midnight hour. The Red Man of the Tuileries, on the contrary, has appeared all through the history of the building, though in the stirring time before the Revolution he was naturally more often on duty. He used to be seen at dead of night, leaning in a sombre fashion, with folded arms, over the staircases, or at one of the great windows overlooking Paris. A few days before the tenth of August, Marie Antoinette's women rushed into her apartment to tell her that they had just seen him in the guard-room, during the absence of the guard. He looked steadfastly at them with a face of unutterable woe. He was last seen during the Commune. The old watchman who had charge of the building was going his rounds one night, when he became aware of a scarlet-clad figure in the gloom, skulking behind one of the pillars. He made for it, but it seemed to pass round the pillar and disappear. He looked about everywhere, but there was nothing. The old man had his own reasons for thinking that he might have been deceived on this occasion, so he took nothing but coffee after dinner next night before making his rounds; yet there was the Red Man again. This time he was leaning meditatively on his arm, and looking down on Paris. The watchman shouted at him; he turned round, faced him with the same look of icy woe, and disappeared. The old man ran for help, late as it was, and they made a thorough search of the place. They did find something red; their search ended in a *sauve qui peut*, as they saw the first glare of the incendiary fire that was to reduce the Palace of the Tuileries to a heap of ruins. — *London Daily News.*

ARTISTIC FIRE-ESCAPES.



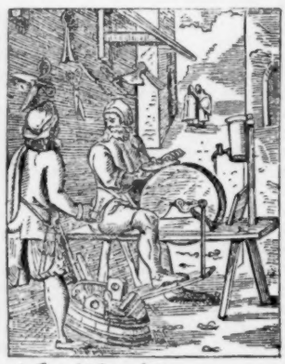
NOW that it is considered necessary to ornament the fronts of all buildings with fire-escapes, it becomes a serious matter to know how this may be done without disfiguring the edifice to which the alleged necessary article is attached. In the first place, it will readily be acknowledged by all who have seen the fire-escapes at present in use that they are anything but ornamental. The spectacle of a building architecturally handsome, but with a landing on the outside at every floor, and a set of black iron ladders connecting the landings, is a sight to make an æsthete or an architect weep. If these exceedingly useful means of escape could only be put out of sight in the rear of the building the case would not be so bad; but it is absolutely necessary that they be on the front of the building. The Inspector says so. Such being the case, the next thing to do is to turn these eyesores into things of beauty and joy forever. We wonder that some enterprising manufacturer has not yet solved this problem. We have been waiting for him to do so; but we can wait no longer, and shall have to tell him how the thing can be done.

Like other great inventions, this is perfectly simple and easy after you have once thought of it. One of the attributes of genius is to put into form that which is already universally nebulous in the minds of the human race generally. That was the way Shakespeare did. Everybody knows the fine things he put into words, but he was the man who first put them into form. That is what we are about to do for the artistic fire-escape. There is no reason in the world why these attachments should not be made as ornamental as they are useful. One form may be called the grape-vine. Instead of running in a hideously parallel and brokenly rectilinear manner down the front of a building, let them meander gracefully all over the front of it, after the manner of a vine. The leaves would serve for steps, and the curling, clinging tendrils for handles to assist one in his descent. The whole thing might be painted green, and a few bunches of purple iron grapes put in here and there would add to the realistic effect.

This form might be varied almost endlessly. Any vine would do as well as the grape, only that has such a sweet suggestiveness when on the front of a hotel! For private houses the ivy might be preferred, or the Virginia creeper, or the mistletoe, or any of those parasitic plants on which poets have expended so much sentiment and ink. Not the least of the excellences of this form of fire-escape would be its educational value. Children in cities, who do not see vines growing in the country, would be taught a useful lesson in botany, and would understand and appreciate much better the poetry to which we have already incidentally alluded.

Of course, the vine is not the only form that could be used. There might be put up an immense full-length figure of Mr. O. Wilde, all hollow, hollow, — head and all, — which could contain a concealed spiral staircase. This would take up more room than the other form we have mentioned, but a niche could be left for it in the middle of the façade, and it would form a very appropriate ornament — we might almost say exponent — for a tall flat. Space fails us to recount the variations which might be made on the plan. It is unnecessary to say more. The scheme is so beautiful, so feasible, and so every way desirable, that it cannot fail to commend itself to the public. — *New York Mail and Express.*

TIMBER-PRESERVING.



A GRINDSTONE OF THE 16TH CENTURY.

A FRENCH apparatus for impregnating and preserving timber, one which is most favorable to the application of the chloride of zinc process, has been patented in the Unit d States, with some slight improvement, by H. E. Kreuter. In brief, it is an application of the old Boucherie plan, which has been in vogue for years in Germany, Austria, France and other foreign countries, where, on account of the lack of abundant timber in many sections, or its inaccessibility, except on lines of road, with consequent high expense in obtaining it, methods of treating timber have been favored and employed universally, principally by the railroads. Any antiseptic agent, with one or two exceptions, can be applied by the apparatus, the Boucherie plan being to make a cross-cut in a log to about nine-tenths of its diameter, insert a wedge, and wind a cord or rope in the edge of the cut, on which the log closes on withdrawing the wedge. In this manner a hollow chamber is formed, and a hole being bored on an incline, a pipe is connected and the antiseptic solution forced in toward either end from the centre, penetrating the tubes of the vascular tissue, and driving out the sap, to be replaced by the solution employed. From experience in this method of application, it is asserted that the means is thorough in its results over the whole timber treated, and the fact of treated timber sometimes rotting inside, or at other parts, and remaining partially sound, is accounted for from the fact of imperfect impregnation, the preparation used in some cases obstructing the progress of the antiseptic, instead of equally and entirely distributing it. The logs are regarded sufficiently impregnated when the fluid running from the end contains about three-fourths of the metallic salt employed and no appreciable quantity of sap.

The apparatus employed by the Houston & Texas Central Railroad is different from the one in question. Cars loaded with ties are run on a track leading into a hollow cylinder, where a steam pressure of one hundred and twenty pounds is applied, the sap, steam, etc., finding outlet below, after which an air-pump is applied, and the highest degree of vacuum secured, which, by means of a faucet, draws in heated creosote from another cylinder beneath, the upper reservoir being thus thoroughly filled. A further application is made of about one hundred and fifty pounds pressure, and the timber is left in the cylinder some six hours, when the cars are rolled out. The Kreuter apparatus is much more simple. The French method involved the use of an elevated tank to secure the necessary power for applying the needed pressure, which obviously could not be regulated for different kinds or sizes of timber requiring a varying pressure. In place of the tank a force-pump is employed. Where the timbers are long, the pressure is applied on the end, instead of the centre, a wood cap being affixed thereto so as to form the hollow chamber, the antiseptic being unable to permeate the cap across the grain. The apparatus consists of a portable steam-engine, the pump and a reservoir, and is placed on a flat car, so as to

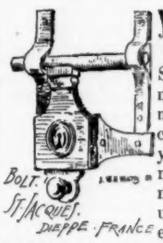
be moved about on railways or tramways. The logs or timber to be impregnated are placed in a yard on a system of framing, on which the distributing pipes are arranged. The boiler of the engine supplies the direct-acting steam-pump, which draws the impregnating fluid by a flexible tube from the mixing tank, forcing it into a wrought-iron cylinder. In addition there is a platform for unloading the logs upon the framing, from whence they are rolled up an incline, to be cut by a circular saw. The machinery required for a portable apparatus, with an average capacity of six hundred ties daily, will cost about $2,500. The apparatus only requires separate yard fixtures and caps to be applied to telegraph-poles, bridge-timbers, or any form of timber. The woods with coarse and straight grain, and abounding in fluid sap, are the more readily and perfectly impregnated, while there are some kinds of wood of which the natural durability is so great — as, for instance, cedar — that a treatment is superfluous; while on the other hand, many kinds of timber, nearly worthless for fuel or building purposes, can be made as durable as any wood, wearing out mechanically and not by rotting. The inventor designs the adoption of the apparatus as an adjunct to saw-mills, where the logs may be treated before being sawed. The cost of impregnating is so slight that the loss of the material employed, in saw-dust, slabs, etc., will be of small consequence, and compensated for by the thorough results secured by treating the whole log, with the bark generally on.

The practical lumberman or railroad man is interested to know the sense and nonsense of such methods. The plan is by many opposed on the ground that they want to sell timber, and the faster it is consumed the better for them; and the better the plan for treatment, the more gingerly are they in taking hold of it. It should, however, be reflected that such means, when found to be successful in their results, will increase the value of timber, and probably the profit in its manufacture and sale, while calling into use certain timber heretofore little employed or entirely ignored, and increasing the manufacturing possibilities, while at the same time admitting of applying the woods in less supply to a more limited scope of service, so as to extend their period of abundance. Gum, hemlock, yellow-pine, and numerous other varieties of timber which are plenty, come into consideration. If the white-pine of the North had competitors more worthy of its steel in the way of general availability, there would be less cause for the howl about its rapid exhaustion, and there are many ways in which treated timber might take its place.

In Austria, Germany and France there are some eighty roads that use treated ties, and thirty-three of them have records of successful processes of treatment. The chloride of zinc method, or burnettizing, takes the preference for several reasons. Its practicability is the best established, the objections to its use are few, and the cost is slight. When applied, it is diluted ninety-nine per cent. Kyanizing, or the use of corrosive sublimate, a poison, is dangerous, the workmen who use it running great risks. Convicts are usually employed for the purpose. Creosoting dates back in its use to ancient Egyptian history. Creosote and cedar oil were employed in embalming mummies, and for general purposes of preservation. The common refined tar used contains one per cent of creosote. When timbers are saturated with this they are highly inflammable, but the process is not particularly dangerous to the workmen. There are, in all, some sixty methods of treating timber, only a few of which have borne out a practical test. Pyroxyline of iron is used by repeated application, by means of a hole in the timber, the agent dissolving itself and becoming diffused through the vascular tissues. Soaking in salt, using a solution of gas-tar, rosin and linseed-oil; charring the surface, to protect the body; steaming with creosote, to prevent dry mould; applying sulphate of iron and sulphate of copper, are processes that have met with more or less satisfactory results. A beech fence has already stood twenty-six years, with sulphate of copper. Where dampness gathered around the spikes or nails driven into the material, a chemical action resulted which induced decomposition. The expedient was adopted of dipping the spikes in tar. There are several solutions employed for petrifying, such as carbonate of lime, alum and potash, steaming with chloride of lime and diluted sulphuric acid, etc., but common or Glauber's salt seems as feasible an agent in this way as any that has been tested. In the German experience creosote costs eight times more than chloride of zinc. There a tie is treated at a cost of six cents, while the Houston & Texas Central Road finds its creosoting process to cost sixty cents per tie. Superheated steam is also held to weaken the wood, by destroying the vascular tissues. By simply dissolving old zinc in acid, chloride of zinc can be made for about two and one-half cents per pound, or it is furnished in tanks at three and one-half cents. The patentee figures the cost of impregnating ties, with the apparatus in proper operation, at about eight cents each. The average life of a tie is found to be about five years, while preserved ties can readily be made to last, as they have in Europe, twenty-five to thirty years.

The Royal Railroad Company, of Hanover, Germany, has sent several specimens of burnettized timber by the patented process, as follows: part of the middle of a pine tie which served on the road from 1852 to 1879; a piece from the centre of a beech tie which laid in the road from 1854 to 1879; a piece from the centre of an oak tie which laid in the road from 1854 to 1879; and other specimens. The testimony is also added that the impregnated timber will wear out mechanically before it will rot. E. Buresch, of the Grand Ducal Railroad, and author of a German work on the subject of timber-preserving, makes some statements of the same character. He tells of pine ties lying in a road from twenty-two to twenty-five years, and when taken out, because of damage to the road, they were undisturbed so far as decomposition was concerned, being made into fence-posts and used in other ways. C. Shaler Smith, city engineer of Omaha, Neb., states that the treatment of wood diminishes its tendency to swell or contract, as observed in timbers put into a bridge at St. Louis, the amount of expansion depending on the wood used. He further says: "I used sweet gum, a wood which rots in four months, and swells one inch and a half in sixteen, as the best wood to experiment with, as it could be had at $10 per thousand. The bridge pavement is nearly two years old, is in first-class condition (the traffic is so great that the average life of a three-inch oak plank was only four months), and out of 1,800 square yards I have had to relay only 260 yards on account of hammocking, and this on the first batch laid; with cedar, oak, pine, ash or elm, there would have been no hammocking at all. It is easily prevented by dipping the blocks in coal-tar after treatment, or laying them diagonally. I laid the bridge-block with one-fourth inch joints. Hereafter I will immerse the blocks in liquid asphalt or creosote, and without any joints at all. — *The Northwestern Lumberman.*

AMERICAN SOCIETY OF CIVIL ENGINEERS.



THE regular meeting of the Society was held Wednesday evening, March 21, Vice-President Wm. H. Paine in the chair, John Bogart, Secretary. The death on March 8 was announced of James O. Morse, one of the earliest members, and who had been Secretary of the Society for fifteen years, and Treasurer twenty-one years. An interesting collection of specimens of native wood was presented by John M. Goodwin, member of the Society. The subject of a continuance of tests of Structural Materials was considered. The Secretary made a statement of what had been done up to the present. Mr. O. Chanute, Chairman of a Committee on this subject, related the effort that had been made to secure larger appropriations from Congress; and the subject of the best method for conducting and continuing tests and of collating results so as to secure desirable information, was discussed. Letters were read from General S. V. Benét, Chief of Ordnance, stating that the programme adopted for continuing tests of Structural Materials would be carried out on the Watertown testing-machine to the extent of the very small amount appropriated by Congress, and the circular from the Chief of Ordnance, embracing that programme, was also read. A resolution was adopted to the effect that it was the sense of the meeting that a Special Committee should be appointed by the Board of Directors, to prepare such a programme and promote tests of structural materials, as to secure the best results possible from the Watertown Arsenal experiments.

CONCRETE BUILDINGS.

MEMPHIS, TENN., March 16, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gents,— Can you direct me to any information in regard to material and construction of cement or shell concrete buildings?

An answer through the correspondence column of your valuable paper would greatly oblige

Respectfully, F. B. HUNTER.

[The following, copied from the Chicago *Times*, answers the question very well.—EDS. AMERICAN ARCHITECT.]

CONCRETE BUILDINGS.—The following instructions have been given for the construction of a concrete house by a person who has recently completed one in the same manner:

1. Select, if possible, a dry situation, and get all heavy materials, such as rock, sand, lime, gravel, etc., on the spot as early in the season as possible, say by the first or middle of May, in order that you may avail yourself of the long, warm days of summer for successfully carrying on your operations.

2. The proper materials are lime, sand, coarse and fine gravel, large and small rock, and water. The lime may be from any good, pure limestone, that will slack readily and "set" or harden thoroughly when dry; the sand should be sharp, and as clear from clay, loam, and other earthy matter as possible, and the gravel and rock may be of any size from that of a boy's marble to eighteen inches or two feet square, according to the thickness of your walls.

3. Having fixed on your plan, lay off the foundation, and dig a trench two feet deep, the area of full size of your cellar wall. With a heavy piece of hard-wood, squared or rounded at the lower end, pound or ram down the earth in the bottom of the trench, going over it repeatedly until it is solid and compact. A layer of hydraulic cement-mortar, two inches thick, spread evenly over the bottom of the trenches thus compacted gives you a solid foundation to start on as soon as it "sets" or becomes hard. If you intend carrying up inside division walls of concrete the foundation for these should be laid in the same way. Good hydraulic cement will take at least three parts of sharp sand, but it must be used as soon as mixed or it will "set" and become useless.

4. Cut common 3" x 4" scantling two feet longer than you wish your highest story to be; set up a double row, with the lower end resting firmly on the edge of the hardened cement in the bottom of the trench; range them true and "plumb" them, letting them stand three or four inches farther apart than you desire your wall to be in thickness; then nail cleats across above and below, to keep them in place, adding also

"stays" or "braces," driven slantingly at the upper end. Your skeleton or framework of scantling being all set up and "stayed" firm and "plumb," proceed to arrange your "boxing" for holding the concrete and keeping the walls in shape. This is done by cutting sound inch or inch-and-a-half plank of ten inches or a foot wide so as to fit inside of the two rows of scantling and form two sides of the box. Moveable pieces the thickness of the wall are dropped in between at intervals, to keep the box of the proper width, and wedges driven in between the boxing and scantling, on the outside, prevent spreading by the pressure of the concrete. Wooden "clamps," to slip down here and there over the upper edges of the boxing, will also be found very serviceable.

5. It will be well to have at least four large mortar beds — one on each side of the house, made of strong planks in the usual way. These should be surrounded by casks of water (oil-casks cut in two are excellent), piles of rocks, sand, gravel, etc., — the lime, of course, to be kept under cover, and used as wanted. Slack up your lime till it forms a thin, smooth, creamy mass; add four or five parts of sharp sand, stirring and mixing constantly, and using water enough to bring the whole, when thoroughly mingled, to the consistency of a thick batter. Into this batter mix coarse and fine gravel (that has previously been screened) until the mass is thick enough to be lifted on a common shovel. (The proper and thorough mixing of the sand with the lime, and the gravel with the mortar afterward, are very important, and should only be intrusted to your most careful hands.) Having one or two "beds" full of this mixture, you are ready to begin your wall. Wheel the mortar to the foundation in common railroad wheelbarrows, letting the common hands shovel it into the bottom of the trenches, while the superintendent or "boss" workman spreads it evenly with his trowel. When the bottom layer of mortar, three inches thick, is laid in, wheel large and small rock (previously sprinkled with water) to the wall, and press it into the soft mortar at every available point, leaving a small space between each piece of rock, and working the soft mortar against the plank boxing, to preserve a smooth surface on the wall. When you can press no more rock into the mortar, pour another layer of the latter over and through the rock, then add a layer of rock, as before, and so on, until your boxing all round is full. You have now ten inches or a foot of wall all round built; and if the lime is good and weather dry it will be hard enough in twenty-four hours to raise your boxes another tier. This is readily done by knocking out the wedges between the plank and the scantling, raising up the plank and sustaining it in place by "cleats" nailed on the scantling. In raising the boxing, begin at the point where you commenced laying up the day previous, as that portion of the wall will, of course, be the hardest. It is not necessary to raise all the boxing at once, or go entirely around the wall in a day. A foot or yard of the wall can be completed at a time, if advisable; but if the complete round can be made, so much the better. Planks to cover up with, in case of a sudden shower or when a storm is apprehended, should be provided and placed within reach.

6. We prefer a cement floor for the basement on many accounts, but those who desire a wooden floor should leave air-holes in the outer wall under the lower floor, six inches above the surface. This may be easily done by inserting wedge-shaped blocks or pins through the wall, to be knocked out afterward. When you are ready to lay the floors, level up your wall and run one course of brick all around the thickness of the wall, for the ends of the flooring joists to rest on, filling-in around these ends with concrete when they are fixed in their proper places. The door and window-frames should be made of three-inch yellow-pine, the thickness or width of the walls, and may be set up and built around, like those in a brick house, as the walls progress. A piece of common inch-plank, "cut in" all around them, to prevent the actual contact of the damp mortar, will keep them, in a great measure, from warping. Where base-boards are needed, blocks of scantling may be built in flush with the inner surface of the wall, at the proper distance apart.

EARTH-CLOSETS.

Los Angeles, Cal., March 9, 1883.

To the Editors of the American Architect: —

Gents,— I would like to know about "earth-closets," for hotels or private houses, how constructed, managed, etc.; whether the results claimed for them have been realized; are they of less cost and superior to the better water-closets, etc.?

Please send me a copy of the *American Architect* which contains a clear exposition of the whole matter, or a pamphlet,

Obliging yours, John H. Cooper.

[Earth-closets cost about as much as water-closets of rather inferior quality. They require a good deal of attention, and are certainly inferior in convenience to good water-closets, but are infinitely superior to the common privy arrangements.

Eassie's "Sanitary Arrangements for Dwellings," or his "Healthy Houses," which is the unabridged form of the same book, will furnish a certain amount of information on the subject; and Col. Waring's book on "House Drainage" contains still more useful suggestions. For the attractive, bright side of the subject, refer to the pamphlet published by the Wakefield Earth-Closet Company, Dey Street, New York.—Eds. American Architect.]

NOTES AND CLIPPINGS.

The Competition for Mechanics' Houses. — We desire to request all competitors who take part in the current competition for "Mechanics' Houses" — the programme for which can be found in our advertising pages — to state on their drawings the locality for which the design is prepared. This simple precaution will do much to prevent the passing of a hasty opinion by the professional or casual reader on the possibility of building such a house for the sum named. We trust that even a larger number of architects will take part in this competition than did in the last; and to encourage those who question the profitableness of spending time upon it, we will say that, judging from the number of letters that reach us from persons who wish to build according to one or another of the designs for $3,000-houses already published, the winners of the prizes are not the only ones who will find pecuniary benefit accruing to themselves through these competitions.

Primeval Maps on Stone.— In many parts of Switzerland are often found smooth, flat stones, evidently hand-polished, and covered with dots, lines, circles and half-circles. The origin and use of these stones, known among country people as *Schalensteine*, has long been a moot point among the learned. Some have thought they were charms, others that were they meant to commemorate the dead, or that the signs on them were undecipherable hieroglyphics; but it has been reserved for Herr Rödiger, of Bellach, in Solothurn, to throw a new light on these mysterious relics of the past and suggest a theory concerning them which seems to meet all the necessities of the case. The *Schalensteine*, he says, are neither more nor less than topographical charts, as a comparison of them with any modern map of the districts in which they are found will show. The engraved dots correspond with existing towns and villages, the lines with roads. Even the fords and mountain passes are indicated. Herr Rödiger has examined many of these stones from various parts of the country, and he possesses a collection, picked up in Solothurn, which form together a map of the entire canton. Another significant circumstance is that the *Schalensteine* are mostly found at intervals of about two hours (say, six miles) from each other, and at spots where several roads meet. The former Herr Rödiger calls "headstones" (*Hauptsteine*), the latter he denominates "by-stones" (*Nebensteine*). If he be right in his hypothesis, the places where these stones are met with possessed considerable populations long before the dawn of history; even the villages shown on the *Schalensteine* must be far older than the Christian era. Herr Rödiger considers the Swiss map stones to be of the same origin as the similar stones which are found in Germany, Scandinavia, India and farther Asia, and sees in them another proof of the high antiquity and common origin of the Indo-Germanic races, and the existence among the latter in an indefinitely remote age of civilized habits, organized trade, and more culture than is generally supposed.—*Correspondence of the London Times.*

Archæological Discoveries in Mexico.— Important archæological discoveries have recently been made at Mitla, a village in Mexico, which is situated between twenty and thirty miles from Oajaca, in the tableland of Mixtecapan. Extensive remains of ancient palaces and tombs have been revealed, and it is stated that they are exceptionally remarkable from the columns supporting the roof, a style of architecture peculiar to the district of Mexico in which they have been found. These ruins have been explored and photographed by Herr Emil Herbruger, although he was not permitted to excavate the sites. In a description of the ruins, Herr Herbruger states that the great hall contains six columns, and is 37 metres long by seven broad. Each column is 3 1-2 metres in height and is of solid stone. The hall, which is entered by three doorways, was used as an antechamber for the royal guards. The tombs are all of equal size and T-shaped. The walls are embellished with stone mosaics. The vault floor is one metre below the surface, and at the entrance stands a monolith column. The tombs extend in order from the column, each being five metres long by one and a half broad; there are also several columns, each two metres high and one and a half in diameter. For some time Herr Herbruger and his Indian attendants used the tombs as sleeping apartments, but subsequently the Indians refused to sleep in the tombs, on the ground that they were haunted. The explorer intends to publish a work descriptive of these discoveries, with photographic illustrations.— *Scientific American.*

Pile-Driving by Dynamite.— In the course of executing some municipal works at Buda-Pesth, the piles already driven were required to stand a greater load than had been originally contemplated. It was, therefore, necessary to test them, and drive still deeper those that yielded. On account of the expense of bringing a pile-driving machine successively over each pile for so little work, it was determined to try the effect of dynamite; and the city engineers applied to Colonel Prodanovic, of the Second Regiment of Austrian Engineers, to carry out the experiments. According to the *Wochenschrift des Oesterreichischen Ingenieur und Architekten Vereins*, the piles were cut square, and a wrought-iron plate, 15 inches in diameter and 4⅛ inches thick was placed on the top of each. On its centre, and immediately over that of the pile, was placed a charge of No. 2 dynamite in the form of a cake, 6 inches in diameter and three-fourths-inch thick, and weighing 17½ ounces avoirdupois. This was wrapped in parchment paper, covered with clay, and fired. The effect produced was found on an average to be equal to five blows from a 14⅛ cwt. monkey falling from a height of 9 feet 10 inches. The iron plates stood from twenty to twenty-four explosions. The system is not considered applicable to a pile standing considerably out of the ground, but saves a great expense when piles already driven have to be sunk deeper. In this country gunpowder has been used for many years, particularly in Philadelphia, for pile-driving, though employed generally to drive the monkey upward. — *Scientific American.*

A Michigan Sanitary Convention. — A Sanitary Convention is to be held at Reed City, Michigan, under the Auspices of the State Board of Health, April 26 and 27 next. Five meetings will be held, opening with an address by the President, Rev. G. L. Beach, and papers are expected on a variety of subjects relating to infectious diseases, ventilation, sewerage, water-supply and the legal side of sanitary efforts with reference to the State and the citizen. The list of Vice-Presidents shows that the gathering is intended to be local.